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ABSTRACT

This document is intended to describe the approach of the City Technology Colleges (CTCs) in Great Britain to provide young people older than 16 with a vocationally oriented curriculum while still ensuring their intellectual and cultural development. Following a summary, the first chapter is an introduction. The second chapter describes the old concept of vocationalism, with the low prestige associated with it and four consequences it has produced (low participation rates in postcompulsory education and training; many young people leaving the system with low or no qualifications; few science and technology graduates produced by the United Kingdom; and, until recently, unregulated vocational education standards). Chapter 3 describes current educational reform in the United Kingdom. Chapter 4 describes the provision of vocational education in the CTCs, where efforts have included developing a new model of vocationalism, developing a business culture, broadening and accrediting the curriculum, developing a technological baccalaureate, and developing methods of credit transfer. Chapter 5, entitled "The Shape of Things to Come" provides a glimpse of likely national and international issues related to the opening of the Single Market in Europe from 1993. Appendices describe education in seven countries and the World ORT Union and describe a technological baccalaureate program. There are 53 references. (CML)

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Post-16 provision in CTCs: bridging the divide

Ruth Jones

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Post-16 provision in CTCs: bridging the divide

Ruth Jones

Number 6 in a series of CTC Trust publications
General Editor Dr Helen Sharp

The author

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This series of publications is intended to disseminate within the educational arena in this country and abroad, the information, expertise and experience emerging from CTCs. CTCs are independent colleges; within national guidelines each is free to develop the CTC initiative in its own way. The CTC Trust respects this independence and wishes to state that its publications do not necessarily reflect the policy or practice of the movement as a whole.

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Preface

Now that the National Curriculum has been largely determined and is being implemented for students from the age of 5 to 16, the major debate in education today is on the future shape of the post-16 provision. Further, this debate on post-compulsory education cannot be separated from the need to enhance the competence of the workforce at all levels in order to compete successfully in a world economy – a view which is now unanimously accepted. The place of vocational and technical education in the post-16 provision is therefore central to this agenda.

The Prime Minister, John Major, expressed his personal commitment to enhancing the status of vocational education and establishing 'parity of esteem' between academic and vocational qualifications when launching the white paper *Education and training in the 21st century* in 1991, and in subsequent speeches. There is no dispute between political parties or national agencies on this issue or the need to increase participation in full-time education post-16. The debate is about the curriculum and qualification structures which will facilitate these objectives, and, of course, funding.

Irrespective of one's political views on how education should be funded, there is no doubt that CTCs offer a fertile ground for experimentation in developing the new post-16 curriculum that we all seek. This lively account produced by Ruth Jones illustrates the creative approaches that CTCs are trying out to provide young people with a vocationally oriented education whilst ensuring their intellectual and cultural development. This is being achieved through broad-based, flexible curricula, normally in the form of modular or unit-based programmes. The development of core skills as a central and integral part of the curriculum and the emphasis given to foreign languages and international perspectives are other features to note. The imaginative use of work experience and the creation of enterprises within CTCs are helping to blur the distinction between learning and work and the values and expectations which traditionally separate these activities.

As Ruth Jones points out, the changes which are taking place in the school curriculum are not simply in what is taught but, of equal importance, in the style of learning. Engaging students in creative project work and introducing individual action planning, recording achievement, self-evaluation and review of progress, all place more responsibility for the process of learning on students. Not only does this lead to higher motivation and more effective learning among students but the approach also produces young people who can accept responsibility for their future learning and development and, more generally, their behaviour. This is in marked contrast to traditional academic educational practice which has tended to create dependency rather than individual autonomy.

There is much we can learn from CTCs and related initiatives in education.

Gilbert Jessup,
Deputy Chief Executive and
Director of Research & Development, NCVQ

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Ruth Jones
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(Post-16 Education)

Glossary

The following abbreviations are used in this document:

AEB	Associated Examining Board;
APL	Accreditation of Prior Learning;
BTEC	Business and Technology Education Council;
CBI	Confederation of British Industry;
CPVE	Certificate in Pre-Vocational Education;
CSE	Certificate of secondary Education;
FE	Further Education;
FESC	Further Education Staff College;
FEU	Further Education Unit;
GNVQ	General National Vocational Qualification;
HMI	Her Majesty's Inspectorate;
IOD	Institute of Directors;
NCC	National Curriculum Council;
NCVQ	National Council for Vocational Qualifications;
NRA	National Record of Achievement;
NROVA	National Record of Vocational Achievement;
NVQ	National Vocational Qualification;
RSA	Royal Society of Arts;
SEAC	Schools Examinations and Assessment Council;
TQM	Total Quality Management;
TVEI	Technical and Vocational Education Initiative;
UMIST	University of Manchester Institute of Science and Technology;
YTS	Youth Training Scheme.

Summary

There have been three reform movements this century which aimed to broaden the educational opportunity available to all children in England and Wales, with particular reference to vocational education and training. However, the chief routes of progression to higher education are still via the academic rather than the vocational or technical routes. This has been attributed to an English class-based prejudice in favour of academia against the world of work. Hitherto, the word 'vocational' signalled 'second-class education'.

This attitude has contributed to a low participation rate in post-compulsory education and training for 16 to 18 year olds, a large number of young people who leave the education system with low or no qualifications, a poor record for producing science and technology graduates, and some confusion over the standard which vocational qualifications represented.

Current UK reform aims to address these problems and to raise the status of vocational education. TVEI laid much of the groundwork for current reform, the main elements of which are:

- *Raising expectations.* The RSA recently set targets for the year 2012 which stated that all the population should continue in full-time or part-time education to the age of 21, and should achieve at least NVQ level 4 during their lifetime;
- *Broadening the curriculum.* The inclusion of coreskills in the curriculum for all students is being explored;
- *Establishing parity of status for vocational and academic qualifications.* Several solutions to this challenge have been advanced, including the introduction of BTEC awards into secondary schools, the development of new vocationally-oriented awards, two distinct routes of equal esteem and the use of modular curricula to allow study of both academically and vocationally-oriented units;
- *Emphasizing the individual learner.* There has been a widespread change to individualized modular courses, flexible teaching and learning practice and an emphasis on quality control and customer satisfaction;
- *Developing a new model of vocationalism.* In contrast to the old narrow view of vocationalism, a new model is emerging which concentrates on integrating the world of work into the curriculum, developing vocationally-oriented curricula with progression routes to higher education, and developing new curriculum structures and methodologies.

The rise of interest in vocational qualifications has meant a greater prominence for the vocational awarding bodies in partnership with NCVQ. This partnership aims to create a framework of coherent standards for all vocational awards, to relate awards to the skill required to fulfill a job, and to provide training and recognition for those who lack formal qualifications.

CTCs are making a strong contribution to UK reform and to the development of this new model of vocationalism through piloting projects and working closely with the vocational awarding bodies; post-16 provision in particular demonstrates this contribution:

- Post-16 education and the world of work:
  - A business-like culture exists and is encouraged in all CTCs;
  - A close involvement with local industry through secondments, training and joint projects is fostered. Some CTCs have small businesses located on site;
  - A project involving CTCs, the CTC Trust, the Further Education Staff College and some grant-maintained schools is working to devise Total Quality Management systems appropriate for a secondary school context;
  - Work experience is integrated into the curriculum as learning and teaching material;
  - There is particular emphasis on vocationally-oriented awards such as those of RSA, BTEC and City and Guilds;

- Broadening the curriculum:
  - A broad range of vocationally-oriented options are offered in addition to academic awards;
  - Relevant and work-related accreditation at NVQ level 2, i.e. below 'A' level, is being sought;
  - Curriculum strategies which allow students a choice of accreditation are being developed;
  - A coherent common curriculum for post-16 students is being explored;

- Developing new vocational routes which have parity of status with academic progression routes to higher education:
  - Staff and students from higher education are involved in a many CTC projects;
  - A new award, the Technological Baccalaureate (TechBac), which has at its heart a system of credit transfer has been developed by the CTC Trust, four CTCs and City and Guilds;
  - New BTEC, LCCI and City and Guilds awards are being developed and piloted in CTCs;

- Developing new curriculum methodologies:
  - New schemes for exploring the potential of credit transfer are being piloted in two CTCs;
  - Modular curricula are being developed in CTCs. The completely modular curriculum operating at the BRIT School is currently being investigated by students from Sussex University.

CTCs take their place in an international context of change and reform in vocational education. They have adopted and adapted appropriate elements of international education models, such as the increased emphasis on Mathematics and Science, broad modular curricula and a choice of study routes. As the debate moves from discrete post-16 provision to an integrated approach to 14-19 education, CTCs can play a significant part in providing an extra element of choice particularly in scientific and technological education.

I. Introduction

The UK has a high number of school leavers with low or no qualifications, and a lower participation rate in post-compulsory education and training than many of our competitors or European counterparts. Levels of achievement in mathematics and science which underpin an understanding of technology are particularly disappointing. One of the main factors contributing to this situation is the low esteem in which vocational qualifications have been held and the lack of vocational progression routes to higher education. At school, education may be seen as irrelevant to the real world of work and therefore further study and training may be regarded also as unnecessary and irrelevant. Raising the status of vocational qualifications and integrating business culture into the curriculum are central themes of the CTC mission.

An age which has seen progression from the invention of the internal combustion engine to sophisticated satellite technology in a span of 120 years demands increasingly a workforce skilled at all levels, particularly in science and new technology. Worldwide, nationals from Sweden to Korea are restructuring their education systems to provide a world-class workforce. The workers of the 21st century are in our classrooms now and changes of both attitude and practice are urgent and essential.

Recent educational reform demonstrates a revival and redefinition of vocational education in this country. Hitherto, education leading to either general or specific preparation for the world of work has been the poor relation of academic study where knowledge is pursued for its own sake. This denigration of vocational education has had particular and far-reaching effects on our modern economy and places us at an increasing disadvantage with international competitors whose educational systems exploit more fully the potential of their workforce.

A new model of vocationalism is now emerging, through work by the National Council for Vocational Qualifications (NCVQ) and the vocational awarding bodies. This movement looks to explore new vocational routes, to redefine the concept of vocationalism and to raise its status.

CTCs have a great contribution to make towards these developments. A significant achievement of CTCs to date has been the development of a coherent vocational policy which has led to a raised profile for vocational qualifications. For a number of institutions, this has required the creation of a whole-school culture and environment. A measure of the success of this approach is the massive over-subscription for every CTC. This positive image underlines the CTC mission to develop a modern redefinition of

vocationalism, which, as this report shows, is already bearing fruit in post-16 development work.

II. The old concept of vocationalism

The desire to reorder the English education system in line with the needs of business and industry and to raise general educational achievement is not a new one. These issues have preoccupied English educational philosophy for the last 150 years and have given rise to three major reform movements this century, all of which have failed in their avowed intentions.

In discussing the failure of these reforms, Wooldridge (1990) details a fatal dichotomy between developing the educational levels of the individual and providing a sound base of skills for the needs of business and industry. Wooldridge attributes this to old class prejudices, where a liberal 'gentleman's education' (often supported by a little private income) was the enlargement of the spirit and the development of good taste.

In the early 19th century, education harnessed to the needs of business was frequently viewed as being vulgar. The great public schools saw their role as fitting gentlemen to be leaders and administrators rather than priming them for 'lowlier' careers in industry and commerce. Liberal arts subjects dominated the curriculum since study of the classics was considered more improving than study of science. Thomas Arnold, headmaster of Rugby, went so far as to bar science from the curriculum as incompatible with the moral and spiritual development of a gentleman, although pure science was taught in other schools. Technology, the practical application of science to the world of business and commerce, did not feature in the curricula of any of the great public schools. Consequently, the study of pure science for its own sake became divorced from technology.

By the mid-19th century, there grew up a chasm between the empirical practice of business and industry and the pure scientist. Lyon Playfair, an eminent scientist of the time, noted that:

> We have eminent 'practical men' and eminent 'scientific men' but they are not united, and generally walk on paths wholly distinct. From this absence of connection there is often a want of mutual esteem and a misapprehension of their relative importance to each other.

Technical education was of relatively low status – often an extension of the apprenticeship system – and was developed piecemeal in response to employer need. Huxley's judgement on the 19th century public schools in England, which has remained true of English education until recently, was:

> You shall learn not one single thing of all those you will want to know directly you leave school and enter business life... You may become a manufacturer but you shall not be provided with the means of understanding the workings of one of your steam engines, or the nature of the raw products you employ. (Bibby, 1971)

Organizations promoting technical education did exist, however, and the number was growing, largely due to an impetus from business and industry. From 1850 a variety of institutions offered technical education, allied to the needs of business and industry. By 1860 there were 610 Mechanics Institutes in England. In 1873 and 1879, respectively, the Royal Society of Arts (RSA) and the City and Guilds of London Institute set up examinations in vocational subjects, having sent a commission to survey leading industrial nations and report on their systems of technical education. In 1881 a Royal Commission to consider technical education recommended that charities and local authorities should set up technical schools. By 1890 good technical instruction was available in a number of organizations, including specifically technical schools.

Institutions such as Imperial College London and UMIST (University of Manchester Institute of Science and Technology) were established, dedicated to educating students for careers in industry and commerce. However, they were and still are relatively isolated examples. The provincial universities which were initially intended to provide industrial training for local needs gradually changed to see their role as spreading liberal and ruling class culture to enlighten the provinces. On the Continent, many technological institutions from secondary school to university level were being developed. For example, in France and Germany technological education received a lead from the top with such institutions as the *Grandes Ecoles* and the *Technische Hochschule*.

The 1902 Education Act established secondary schooling for all in England and Wales. However, it made a single grant for approved courses which favoured a curriculum based on the new grammar schools, which themselves had adopted a watered-down version of the classical and academic 'gentlemen's education' offered by the great public schools. The new growth of practical and vocational curricula found no favour in this environment and their promotion therefore waned.

In the 1930s and 1940s Britain was once again reassessing its education system, particularly in the light of competitors such as Germany, which had built a sure educational foundation to underpin the needs of its burgeoning industry. Again, there was a movement to promote scientific and technical education. The Spense Report of 1938 recommended a tripartite secondary system of 'modern', grammar and technical high schools, noting the importance of the establishment of parity between all

three as fundamental. In Germany, this type of system prospered and is the foundation of the present day structure (see Appendix A). However, in England the success of the classically-oriented grammar schools and the great public schools meant that this tripartite arrangement simply reinforced class division, as noted by writers half a century apart:

> The hereditary curse of English education is its organization along lines of social class. (Tawney, 1931, p. 142)

> The facts of a hereditary traditional monarchy... together with the survival of institutions of the past like the Inns of Court, ancient universities and many more have meant that the English are more obsessed with class and equality than our continental neighbours. (Pilkington, 1991)

There was little interest and little investment from the State in technical and vocational education and fewer technical schools were set up than was originally intended. Although they proved popular with students where they existed, technical schools accounted for only 7% of the overall schools' population.

The third major reform movement, comprehensive education, took place in the 1960s. It attempted to overcome the barrier of class by providing a sound educational base for all, but science and mathematics were still not popular. They were regarded as subjects for the more academically-inclined students rather than as fundamental disciplines for practical subjects such as engineering and construction. The narrow view of vocationalism as skills-based training for those incapable of academic success persisted.

The chief routes of progression to professional status were still via the academic rather than vocational or technical routes, and the same is true today. Even though it is possible for students to progress via vocational programmes designed by the Business and Technology Education Council (BTEC) and by City and Guilds awards, a survey of two universities and two polytechnics by Professor Alan Smithers (1990) found that of the 18/19 age group 81.6% arrived by the 'A' level route (although about three quarters of the students arriving by other routes had BTEC awards). An inadequate foundation in mathematics was quoted by many higher education lecturers as a major stumbling block for students progressing by vocational routes. Admission tutors showed prejudice in favour of 'A' level students if only because of ignorance of any standard presented by vocational qualifications.

The consequences

This emphasis on academic study and the prejudice against vocationalism and scientific subjects is reflected in the record of the educational system of this country. In June 1988 the *Financial Times* noted:

> Vocationalism is a dirty word. Courses provided by TVEI and City and Guilds leading to vocational qualifications are considered to be second-rate. Snobbery is rife.

There are four main consequences of this attitude:

1. Low participation rate in post-compulsory education and training
Table 1 (DFE, 1991) shows that the UK has a lower rate of participation in education and training for 16 to 18 year olds than nearly all her major competitors and counterparts in the European Community. Although this rate rose in 1989, and latest figures from Her Majesty's Inspectorate (HMI, 1992, p.26) show that 73.4% of 16-year olds continue in education, these figures are below countries such as Germany (92%), USA (81%) and Japan (79%).

Table 1. *Participation in education and training of 16-18 year olds (DFE, 1991, p. xvi)*

	16 years			16–18 years		
	Full-time	**Part-time**	**All**	**Full-time**	**Part-time**	**All**
Australia	73	12	82	51	17	67
Belgium	92	4	96	82	4	87
Canada	92	–	92	75	–	75
Denmark	89	2	91	73	6	79
France	80	8	88	69	8	77
Germany	71	29	100	49	43	92
Italy	54	15	69	47	18	65
Japan	92	3	96	77	3	79
Netherlands	93	6	99	77	9	86
Spain	65	–	65	50	–	50
Sweden	91	1	92	76	2	78
United Kingdom						
1987	50	41	91	35	34	68
1989	53	41	93	36	33	70
USA	95	–	95	80	1	81

2. Many young people leave the education system with low or no qualifications

Twenty-one percent of 16-24 year olds in the UK have no qualifications; 12% have only a low qualification, i.e. CSE below grade 1, YTS certificate and so on (DFE, 1991, p.44). Yet it is also true that Cambridge University has produced more Nobel prize winners than the whole of France. Whilst Britain is undoubtedly successful in producing some of the best graduates in the world, the system has largely ignored the needs of around 80% of the population. Such wastage of talent is very damaging for both the country and the individual who may be left with a lifelong sense of educational failure. Paradoxically, this has latterly occurred in a comprehensive school system that has sought, in principle, to protect children from a sense of such failure.

The problem has been compounded by the tendency of the English system towards early specialization in both academic and vocational routes. This hampers transfer between different courses and deprives students of the greater breadth of education found in competitors' systems. Premature specialization at 'A' level would not be attractive to continental employers, which is particularly important for a generation who will be seeking employment after completion of the Single European Market. Whilst English employers recruiting at advanced level typically ask for two 'A' levels, a survey by the Thames-Chiltern Chamber of Commerce & Industry (1990) recorded the following comment of a French company director:

> We would find it difficult to recruit someone with a certificate showing study in only two subjects. English applicants here will be at a disadvantage.

Research has shown that in manufacturing industry a better educated workforce leads to higher output, less machinery breakdown, more organized and flexible production and consequently higher incomes (Steedman and Wagner, 1987). Concentrating on the status and quality of vocational education for British children may therefore result in greater national productivity and more prosperous, fulfilling lives for the British workforce.

3. The UK produces few science and technology graduates

Although England has the second highest levels of scientific achievement amongst 18 year olds in the world, behind Hong Kong but in front of Singapore (Postlethwaite and Wiley, 1991), there has been a decline in the proportion of students opting for higher education in science and technology.

There was a drop in physical scientists and in engineering graduates from 1985 to 1988. A recent *Times* leader 'Rebuilding the Engineer' (9th March 1992) records 'a perceived class bias against work with grubby hands' that

condemns engineering as 'unfit employment for a gentleman'. Tony Gill, chairman of Lucas Industries underlines the point:

> In Britain .. many small firms have no qualified engineers: so the true shortage of engineering graduates is much worse than the figures suggest. (Golzen, 1990)

Progress is hampered further by the fact that British pupils also lag behind in mathematical ability compared to competitors such as Germany and Japan. A recent HMI report (HMI, 1991b) estimated that 50% of the pupils in Japanese schools which they visited achieved *at least* 'A' level standard in mathematics by the age of 18; mathematics and science are compulsory in Japan from 15 to 18.

4. Until recently, vocational awards were unregulated, resulting in duplication and variable standards

In the past, the undervaluing by the educational establishment of vocational awards meant that, although academic examinations were highly regulated with well-publicized and coherent standards, there grew up a plethora of unregulated vocational awards provided by a multiplicity of organizations. Although awards by major bodies such as RSA Examinations Board, City and Guilds and BTEC were valued by employers, their worth was understood less by the academic gate keepers of higher education. With little opportunity for students to transfer between academic and vocational systems of study, the infamous academic/vocational divide of English education remained wide.

III. Current UK reform

> There has never been a better time for Industry and Education to get together to provide exactly what is required to make maximum use of our most precious resource – our youth. (Thames-Chiltern Chamber of Commerce & Industry, 1990)

At present, what Leonard Cantor (1989) has termed 'the reluctant revolution' gathers momentum. Education is again at the top of the public agenda. This is the fourth attempt in England at the kind of revolution in vocational education that continental competitors such as Germany accomplished successfully nearly a century ago. It is a situation which offers exciting opportunities for innovation and a chance to address the problems caused by the past prejudice against vocationalism. The current debate has been documented exhaustively of late (CBI, 1989; Ball, 1990; 1991; The Royal Society, 1991; IOD, 1991). However, resistance to the promotion of vocationalism should not be underestimated. There is widespread public accord about the necessity for change, but as yet the implementation is at an early stage.

TVEI – preparing the groundwork

The current public interest in work-related education is not a sudden phenomenon. The Technical and Vocational Education Initiative (TVEI) movement, given impetus by the 1986 White paper *Working together – Education and Training*, laid the ground for many of the issues now prominent. Current educational thinking owes a great debt to much of the work carried out at a local level under TVEI sponsorship. The TVEI extension programme, for example, sought to broaden the curriculum for students from 14 to 18 by adding work-related studies, technological skills and work experience. A 1988 publication from the Training Agency (TVEI, 1988, No. 1) details various projects throughout the country concerned with such issues as building modular post-16 curricula with BTEC awards and 'A' levels (Cambridgeshire project), promoting a business education entitlement for all students (Leicestershire project) and the integration of information technology across the curriculum (Norfolk project). Other TVEI- sponsored development included work with Records of Achievement and a common curriculum entitlement.

Much of this early work provided direct inspiration for current reform. Much CTC practice builds on TVEI experience through the previous TVEI involvement of curriculum planners. However, although the work was significant, a national climate for change was lacking and much worthy progress remained localized. Without mainline reform of the awarding structure, TVEI initiatives remained an adjunct to the curriculum. Significantly, the foreword to *Developments 3* (TVEI, 1988) notes:

> Teachers who are not fully familiar with the widening scope of what goes on under the TVEI banner may be surprised to discover the range of thinking converted into action ... it can't be denied that there are still far too many 'outsiders' who will confess to an estrangement from a programme they have not comprehended at all. (p. v)

Some of the TVEI-funded work with awarding bodies involved pilot work with new frameworks such as the BTEC/City and Guilds Certificate in Pre-Vocational Education (CPVE). This award aimed at fulfilling many of the current demands for an integrated, work-related curriculum, but was ahead of its time and received a lukewarm reception from the educational mainstream. CPVE, as other vocational awards, suffered from the prevailing prejudice against work-related education. The TVEI co-ordinator for Norfolk at that time noted a need, despite progress in curriculum development, for 'radical changes in education and culture' (TVEI, 1988, No. 3, p. 53).

TVEI also exemplifies one of the major difficulties in the reform of vocational education, as noted in a recent report by the Further Education Unit:

> Development has been hampered by the proliferation of initiatives over the past decade. These have mostly aimed to provide a broad and balanced curriculum which will enable the learner to develop the sort of skills, knowledge and understanding which they will need in employment, Further or Higher Education and life in general. However, there has been little attempt to link the initiatives... often resulting in confusion and duplication of effort. (FEU, 1992a)

Raising expectations

Reform was galvanized in 1989 by a seminal work that focused attention and formed a foundation for subsequent debate – the Confederation of British Industry's report *Towards a Skills Revolution* (CBI, 1989). Initially, the recommendation that by 1995 nearly all young people should attain National Vocational Qualification (NVQ) level 2 or its academic equivalent and that by the year 2000 half the age group should attain NVQ level 3 or its equivalent caused a stir to a nation accustomed to hearing that the average educational attainment of an English pupil was CSE grade 4. Yet already these targets are being seen as a bare minimum in comparison with those of other countries and research into the education systems of international competitors by HMI and others show that such national targets are well within reach when curricula are better suited to students' needs and interests. More recently, the RSA has set targets into the 21st Century (see Table 2).

Table 2. *RSA targets for 21st century (Ball, 1992)*

	by 2002	by 2012
Participation	all to continue full-time or part-time to age of 18	all to continue full-time or part-time to age of 21
Attainment	all to NVQ 3+ during lifetime	all to NVQ 4+ during lifetime

Broadening the curriculum

The CBI also called for a broadening of the curriculum as a base for training in later life and the inclusion of a range of core skills, useful to employers, for all students. Core skills, or common skills had been a feature of Youth Training, BTEC awards, CPVE and TVEI, but endorsement of the concept by the CBI focused attention and, following a remit from Government, they were subsequently consolidated by the National Curriculum Council (NCC, 1991) as:

- Communication;

- Problem solving;
- Personal skills;
- Numeracy;
- Information technology;
- Modern language competence.

Much work has been carried out jointly by a range of bodies including the NCVQ, the Schools Examinations and Assessment Council (SEAC) and the Further Education Unit (FEU). BTEC and major examining bodies are now incorporating the assessment of core skills in academic and vocational programmes and including the possibility of credit transfer.

The debate over broadening 'A' level study has still not reached resolution, despite repeated calls for reform (Higginson Committee, 1988) which called for a broader programme of 'leaner, fitter' 'A' levels. There have been a number of imaginative initiatives since the inception of TVEI, involving modular programmes with BTEC, such as the Cambridge Board's modular bank scheme and the Associated Examining Board (AEB) Wessex pilot. The recent emphasis seems to be on considering an individual student programme as a whole with a broad core entitlement assessed across the programme, rather than the incorporation of a core skills requirement in every 'A' and 'AS' level subject. The recent ruling from SEAC of a limit of 20% coursework assessment may, however, limit this flexibility.

There has also been a revival of interest in the concept of the 'curriculum package' as a form of accreditation for a broad programme incorporating a core requirement, work experience and other elements of a student's programme such as enrichment studies and pursuits. The concept of the former CPVE has been revised by City and Guilds to form their new Diploma of Vocational Education. The new Technological Baccalaureate (TechBac), formulated by CTCs in partnership with City and Guilds, also seeks such all round accreditation, with an emphasis on the acquisition of additional technological skills and knowledge.

Parity of esteem

One of the most crucial issues in the current debate concerns reform of the awarding structure. In other competitor countries such as France and Germany (see Appendix A) vocational study is not the poor relation of academic study because each route offers progression to higher education and employment. Hitherto, in England the academic route to higher education has long been accepted as the preferred option.

Several solutions to the challenge have been advanced. Many have favoured modular structures which would allow the pursuit of both vocational and academic aspects of study, whilst accrediting the student's study programme as a whole. Sir Christopher Ball (1991) suggested a modular framework post-16 that would facilitate credit transfer between options, allow flexibility in building individualized programmes and provide students with a series of planned goals, a proposal that has features in common with Scotland's National Certificate (see Appendix A).

The Royal Society (1991) called for a balance of study across three domains: social, economic and industrial; scientific, mathematical and technological; creative, language and aesthetic. Students could study for foundation and advanced modules. The scheme has much in common with the proposed British Baccalaureate put forward by the Institute for Public Policy and Research (Finegold *et al.*, 1990), and the integrated Advanced Certificate of Education and Training put forward by the Labour Party in their policy document *Opportunity Britain*. This system, it was suggested, would form part of the proposed NVQ framework with advanced modules leading to NVQ level 3 equivalent.

A recent discussion paper from the FEU (1992b) also proposes a credit accumulation and transfer (CAT) framework encompassing all levels and types of qualification from key stage 4 of the national curriculum through to higher education qualifications.

The government's White Paper on post-16 and higher education reform *Education and Training in the 21st Century* proposed two distinct academic and vocational routes with parity of esteem and pledged that barriers to equal status for vocational routes will be removed. The Royal Society's proposal of Advanced Diploma and Advanced Certificate which are awarded on a system of credit points finds favour as a method of achieving such parity, but leaves 'A' levels relatively untouched as students may qualify equally whilst pursuing either a vocational or an academic path or by taking a mixture of academic and vocational options together with some core skills. This approach is endorsed by the Institute of Directors (IOD).

The government has also endorsed the promotion of existing vocational qualifications such as BTEC awards for use in schools, together with the development of new options from the other major awarding bodies. BTEC, previously the province of further education (FE) colleges, provides a broadly vocational programme suitable, with some adaptation, for schools. BTEC progression routes to higher education have already been recognized. The NCVQ has also been developing standards for a new type of vocational award, General National Vocational Qualifications

(GNVQs), whereby the underpinning knowledge for vocational areas provides a broad course of study which prepares students equally for employment or for related higher education.

The significance of NCVQ

The rise of interest in vocational qualifications has meant greater prominence for the vocational awarding bodies, in partnership with the NCVQ. The establishment of the NVQ framework presents exciting opportunities to build a coherent system that will embrace and validate all training and education. The main aims of this partnership can be summarized thus:

1. The creation, by means of a five-level framework, of coherent standards for all vocational awards;
2. The close relation of the award to the skill required to fulfill the job;
3. The provision of training and recognition for large elements of the workforce already employed but who lack formal qualifications.

The five-level NVQ framework (see Figure 1), originally devised to regularize standards of vocational awards, has gradually gained recognition in all areas of education and is now frequently used as a model of the education system as a whole. One of the aims of the framework was to establish a vocational level (NVQ level 3) as having parity of esteem with the 'A' level 'gold standard'. Accordingly, work has been taking place to establish BTEC National awards under the NCVQ umbrella at level 3 and much work continues in order to set in place the new GNVQ pilot schemes at level 3 from September 1992. Level 2 GNVQs are also being introduced, although work still remains to be completed on the establishment of awards at levels 1 and 2 and their interface with GCSE awards at 16. There is an increasing emphasis on the establishment of broad vocational routes from 14.

The move to reform vocational education and training in order to respond more closely to the needs of modern business and industry has generated a radical new philosophy of work-based 'competency', best clarified in *Outcomes* (Jessup, 1991). The concept of competency gave rise to the 'standards of a new kind' for the workplace, first mooted in the White Paper on the New Training Initiative in 1981, and which sought to produce a 'flexible and adaptable' workforce. This concept has led to the radical revision of vocational awards. A new unit-based system has been devised which focuses closely on functional analysis to define the essential skills needs for employment. A basis of theory is essential to underpin practice, but the emphasis is on the ability to perform and to function autonomously rather than pursuit of theory for its own sake.

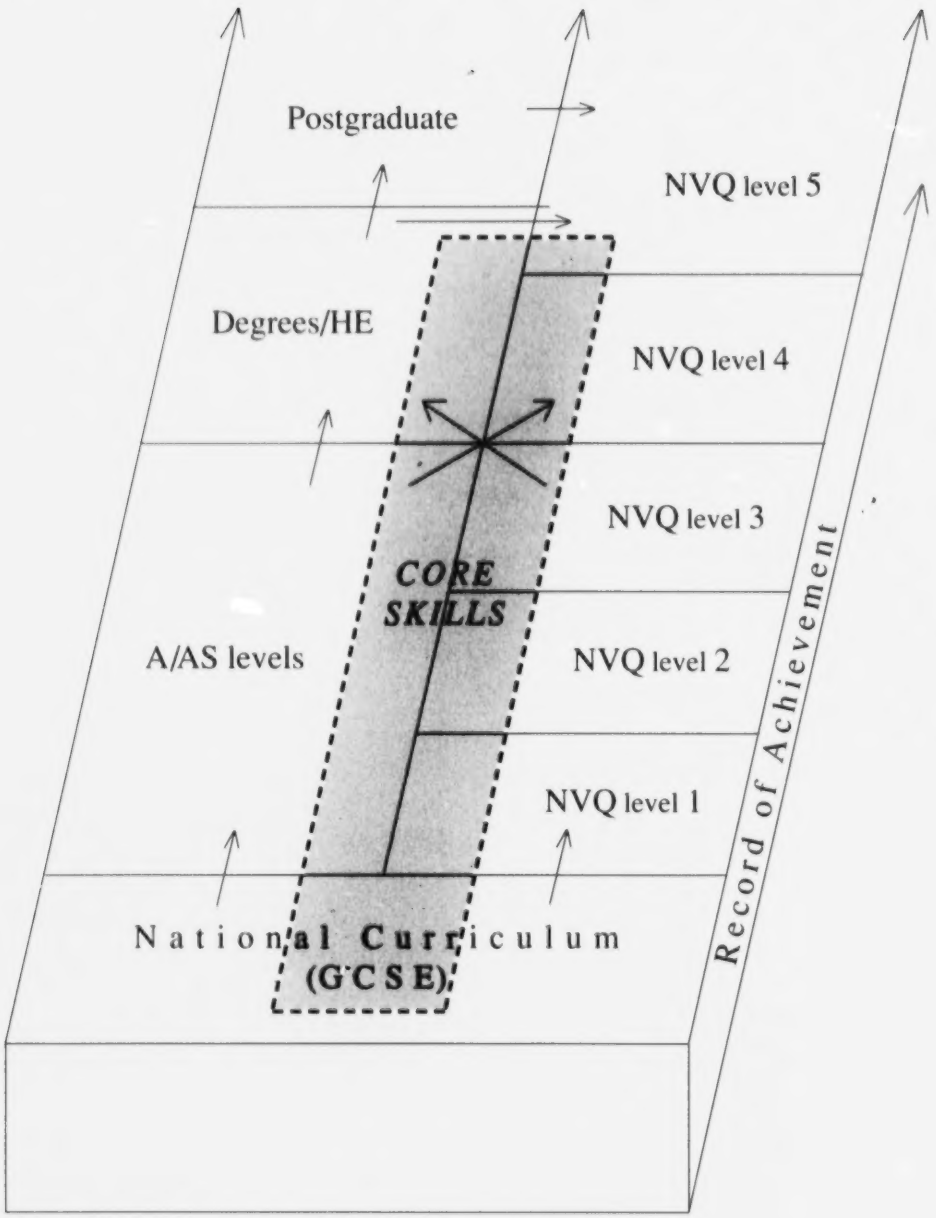

Figure 1. *The five-level NVQ framework (Jessup, 1991)*

Essentially, a competency-based model of education and training prioritizes the needs of the learner and stresses the importance of the outcomes of learning. Hitherto, the emphasis has been rather on the input and process:

> We have what has been described as a provider-led system. What is frequently neglected is the learner... the client or customer of the education and training service. (Jessup, 1991, p.3)

The following principles are central to competency-based philosophy:

- Open access;
- Opportunities for progression;
- The accreditation of prior learning (APL);
- Flexibility in mode of learning and attendance;
- Credit transfer across the framework of awards through common elements.

The individual learner

The impact of such thinking on educational practice in FE has been dramatic, leading to a change of focus from the classroom to the workplace. An emphasis on APL has led to widespread change to individualized modular courses, flexible teaching and learning practice and an emphasis on quality control and customer satisfaction. It has also had an impact on educational thinking at secondary level, particularly for schools seeking to broaden the curriculum by the addition of vocational awards. CTCs have similarly sought to develop appropriate structures to accommodate these changes.

The CBI (1989) report also highlighted the needs of the individual. It was recommended that courses of study should allow for individual tailoring, and that a personal profile, supported by professional careers guidance, should carry a student through education and on into working life. The CBI highlighted the notion of lifelong careership, the idea of equipping a student with flexible skills and a favourable attitude for lifelong training and development to keep pace with technological change, and noted:

> One national system of records of achievement and action plans should be used both in schools and employment pre-16 and post-16. This would require a coming together of school records with the National Record of Vocational Achievement (NROVA) and the embracing of records and action plans within one profile. All young people would then be treated equally irrespective of the route of their learning.

This call for a single comprehensive record was also echoed in the report from the IOD (1991); 80% of the IOD's members surveyed believed it would provide employers with better information when recruiting school leavers but believed that this should go beyond the summary function of the new National Record of Achievement (NRA) currently being piloted. The functions of the NROVA and the NRA are now being incorporated into a single record by NCVQ.

The emphasis on the individual, however, leads to new criterion-referenced assessment systems that do not sit easily with the norm-referenced systems of academic awards. Open access and individual tailoring imply continuous assessment rather than end-testing and modular or unit-based systems rather than discrete courses. Some rapprochement between the two systems is yet to be resolved.

However, to schools involved with TVEI, some aspects, such as modularization, credit transfer and flexible learning methodology, are already familiar. Current reform may justify practice from the early TVEI pilots which has been localized, and bring it into the mainstream. CTCs, along with such schools, are already setting in place new systems for future development that build on these foundations.

Vocational reform and the international context

Other countries have well-developed educational systems that harness young people's varied talents to the needs of business and industry.

In many competitor countries vocational routes enjoy far greater parity of esteem than they do in England. With the establishment of high-tech communications, the world is becoming a smaller place, and the international marketplace grows increasingly tough. It is in this international context that UK educational reform must be seen and ultimately judged. Accordingly there has been much interest of late in international systems of vocational education and the HMI have produced reports on the systems of countries such as Germany (HMI, 1991a), Japan (HMI, 1991b) and the USA (HMI, 1989).

CTCs, which employ a number of key staff from international backgrounds have also been keen to develop international links and to learn from best practice abroad as demonstrated by curriculum development work.

Desirable features that characterize vocational education abroad are presented in Table 3; more detailed descriptions of international models are to be found in Appendix A.

Table 3. *Characteristics of vocational education in other countries*

France	Multiplicity of routes through to higher education and work; Broad curriculum; Vocational routes of esteem from 14; Esteem for science and technology to the highest level through specialist schools; Technical and vocational education regulated nationally.
Germany	A dual system of training in conjunction with industry; Work experience and the work ethic are valued; Broad curriculum; Vocational routes of esteem from 14; Technical and vocational education regulated nationally.
Japan	High levels of business and economic awareness in the curriculum; Broad curriculum; Longer school day; Larger curriculum share for mathematics, science and technology.
Scotland	Broad, modular curriculum; Vocational, academic or mixed individualized curriculum; Choice of progression routes.
Spain[1]	Emphasis on course outcomes rather than content; Transfer between academic and vocational qualifications; Broad curriculum; Vocational routes of esteem from 14; A dual system like Germany's is under consideration.
Sweden[1]	Modular system for vocational training; Competence-based, modular curricula; Academic and vocational courses available in schools.
The USA	Modular curricula; Credit accumulation and transfer; Specialist vocational or technical schools; Magnet schools: schools specializing in science, mathematics, technology and computers, art, drama etc.
The World ORT Union	Culture of science and technology is fostered at all levels; Emphasis is given to vocational education in schools; Weight given to cross-curricular themes.

[1] Spain and Sweden are currently undergoing reform to achieve these goals.

Developing the new model of vocationalism

The old view of vocationalism was characterized by a very narrow view of 'vocational' which was reinforced by systems that offered little opportunity for students to progress to higher education or to broaden their studies beyond craft level.

The concept of a new vocationalism lies with the founding principle that since all students will need to earn a living, all education ultimately has a vocational purpose at whatever level and with whatever subject or course.

The emerging model of a new vocationalism therefore concentrates on three broad issues.

1. It seeks to make vocational study and the workplace of central importance to the curriculum, rather than an adjunct;
2. It concentrates on developing vocationally-oriented curricula and awards that will achieve parity of status with purely academic awards as progression routes to higher education and to provide a useful grounding for the workplace;
3. It seeks to develop new curriculum structures and methodologies to validate new development.

1. Relevance of the curricula to the world of work

TVEI gave emphasis to work experience and vocationally related study, but the world of work was not sufficiently integrated into the curriculum. Students frequently had to travel out to TVEI centres or to local FE colleges for vocational study, thus underlining the fact that the initiative was an adjunct to the curriculum rather than central to its philosophy.

However, making the world of work a central focus of educational experience has been fiercely controversial in the past. There is genuine concern that this will mean the indoctrination of youngsters with narrowly commercial values and the teaching of specific skills at too early a stage of development, thus limiting later choice and compromising the broader, humanistic development of the individual.

However, giving the curriculum vocational relevance is simply to recognize that a young person needs to be educated for both work and life. All students need to be equipped with a broad foundation of vocational skills for transfer into an environment in which they will be called upon to perform many varied tasks and undergo frequent retraining to keep pace with changing technology.

The closer relationship of work and education makes post-16 education more appealing to a wider range of students than hitherto. Students can see

a direct relevance between extra time spent in school and future life opportunities. Current developments to broaden the choice of awards and options available at post-16 are already increasing student numbers.

The application of new technology becomes increasingly important to future employment. If students are to be adequately equipped for work in the 21st Century, a focus on the applied side of science and mathematics as a foundation for technology is paramount.

2. Parity of status for academic and vocational awards

A new view of vocationalism also recognizes that the study of vocational subjects can be as challenging a mental discipline as academic study. A respect for vocational study as a rigorous discipline has always been accepted in higher education, where traditionally vocational subjects as such as law and medicine have high status. Recently the European court of justice ruled that all higher education was a form of vocational training (Editorial, *Educa*, February 1992). However, recognition by higher education of the equal merit of vocational study at secondary level is crucial. The artificial division between academic and vocational study must be removed, acknowledging that any subject can be approached from a number of different perspectives, including but not restricted to the academic and the vocational.

3. A competency-based philosophy for education

Present curriculum reform demands the development of new curriculum structures and methodologies to ensure that students can make choices which lead to open rather than closed doors. A philosophy of competence-based education, underpinning awards in the new NVQ structure, favours the development of individualized curricula. This requires a flexibility which is well served by unit-based or modular courses with credit transfer between options. Development needs to focus on strategies for delivering a student entitlement which may embrace both vocational and academic aspects and awards and allow for transfer between the two.

Assessment systems must also accord more closely in order that higher education may be reassured of the equal rigour of vocational assessment. Development work continues on the creation of new broadly vocational awards such as GNVQs and within education, pilot work is in train on new curriculum structures and methodology to realise reform in classroom practice.

IV. Post-16 provision in CTCs

Developing the new model of vocationalism

CTCs have a strong contribution to make to the development of a new view of vocationalism. All CTCs are committed to the development of a vocational emphasis throughout the school at all levels and at post-16 in particular. A number of strands in development can be identified:

1. Relating the curriculum to the world of work;
2. Broadening the curriculum for a wider range of students;
3. Developing vocationally-related study routes of equal esteem within the CTC special remit of mathematics, science and technology in a business context;
4. Developing a range of teaching and learning strategies suited to new curriculum developments.

The commitment of CTCs to the needs of business and industry can be seen in work-related curricula, the forging of industrial partnerships and the integration of science and technology using the workplace and real life work assignments as curriculum material. In CTCs curriculum choice leading to preparation for the worlds of business and industry is not a second-class option, a fact clearly apparent in the fostering of a business culture that permeates every aspect of school life. This has not however been at the expense of academic excellence as shown by curriculum projects designed to allow students dual academic and vocational accreditation.

CTCs have been successful in attracting a broad range of post-16 students. They have been keen to address the challenge of providing genuine opportunities for a wider range of students leading to both employment and higher education and backed by sound accreditation. It is an achievement that CTCs have devised imaginative and innovative projects and initiatives to address this issue over a period of great change in post-16 education, when there have been few firm landmarks for guidance. There has also been an emphasis, clearly shown in initiatives such as the Technological Baccalaureate (TechBac) on the still unresolved issue of providing sound currency and progression opportunities at NVQ level 2 as well as developing vocational routes of equal esteem with 'A' level awards at NVQ level 3.

CTCs also work closely with the major awarding and accreditation bodies, both academic and vocational. They have developed particularly close links with the vocational awarding bodies: BTEC, City and Guilds and the RSA Examinations Board. Both BTEC and City and Guilds are sponsors

of the CTC Trust and NCVQ have supported projects in CTCs in addition to training seminars.

In response to the national concern to increase the level of expertise in mathematics, science and technology in England's future workforce, the intention of most CTCs at post-16 is to offer a specialist range of largely scientific, technological and business awards to a high degree of excellence. A number of pilot projects and development work clearly demonstrates that intent. Those CTCs that 'grow their own' post-16 students can start planning for this situation now. Those opening their doors immediately to a new intake who will not have had the benefit of a CTC grounding in these subjects have to plan longer term. They usually favour a pragmatic approach, suited to the needs of their students, and offer an initially broader curriculum with achievable goals.

It can be argued that CTCs are making their particular contribution both in their close relationships with business and industry and in their adaptation into a secondary school context of the practice and philosophy developing in vocational study in FE colleges. FE, the traditional 'cinderella' and now arguably the most innovative sector of the English education system has transformed itself over the last decade in response to factors such as industrial change and unemployment. It has provided a fertile source of inspiration to CTCs in devising curricula sensitive to the needs of both students and its business and industrial clients and in flexible, individualized teaching and learning methodology. The emphasis on the central experience of the learner as client and the practical translation of knowledge into 'competency' which underlies NCVQ philosophy has led to an interest in flexible, individualized learning and teaching strategies, first pioneered in FE and now translated into a schools' context. In turn, CTCs by working with bodies such as the FEU and the NCVQ, hope to contribute to the pilot work being carried out in the areas of core skills integration and credit transfer.

Although not all of the existing CTCs currently have post-16 students, the contribution being made by CTCs is clearly demonstrated through post-16 development work. A number of curriculum development initiatives have been designed in partnership with major academic and vocational awarding bodies and with industry. Pilot projects are running in several CTCs, designed to provide alternative vocational progression routes into higher education and employment and to contribute to general issues of curriculum reform such as the broadening of the curriculum for all students. CTCs have built upon UK and international reform and practice, assimilating and adapting characteristics and techniques appropriate to their mission. They have also found a role themselves in informing international reform, as the large number of foreign delegations to CTCs

from countries as far apart as the USA, Europe and Japan clearly shows. Members of the CTC Trust curriculum team have also been invited to present and advise educationalists in Spain, the USA and Australia. A summary of the pilot projects and developments being undertaken in CTCs is presented in Table 4 and detailed in the sections below.

Post-16 education and the world of work

Because of their close relationship with their business sponsors and their mission to develop a curriculum responsive to the future needs of industry, the world of work permeates the daily life of CTCs in all its aspects. This impacts on working practice in two major ways:

1. The development of a business culture throughout the school;
2. The integration of business and industrial experience within the curriculum as course material.

Developing a business culture

The usual division between the demands and practices of the worlds of school and work are less in evidence in many CTCs, all of which have a close relationship with their business and industrial sponsors. Sponsors have a large influence on the day-to-day life of the school, both through their membership of the governing bodies and through the support and time given to the school, frequently by senior management staff. The business-like reception areas in all CTCs, general business-like layout and environment and workaday practices such as clocking on via the electronic registration system with a Smart card, which is found at Brooke College, all help to reinforce a business-like culture throughout the school. At Thomas Telford School, for example, the post-16 students are expected to dress formally for business at school as well as at their work placements, a move that has found favour with both students and employers alike. At ADT College in Wandsworth, the management structure reflects that of industry. The College is led by a team comprising a Chief Executive from the business world, and a Managing Director in charge of curriculum who are supported by a board of academic and administrative directors servicing all aspects of school management. In this way, it can be seen clearly that there is no division of caste, as so often happens at all levels in education, between matters academic and the business of running the school.

It is true that in the wake of the Educational Reform Act (1988) which has led education at all levels to manage budgets, there is a new respect for financial and administrative expertise. This is now increasingly reflected in the senior management structures of schools and colleges. However, whilst the main motivator to greater equity in many cases has been financial necessity, in CTCs the message is again deliberately reinforced: that a

Table 4. *A summary of pilot projects and post-16 developments in CTCs*

College	Collaboration with			
	City and Guilds	**BTEC**	**NCVQ**	**Other**
Bacon's College, Rotherhithe		BTEC/'A' level stem; BTEC First in Technology	GNVQ	
BRIT School, Croydon		BTEC National awards in Media, Performing Arts and Business and Finance (Entertainment Industry Administration); BTEC First in Performing Arts	GNVQ; Record of Achievement; NVQ	Completely individualized, modular curriculum with interrelated accreditation; RSA GNVQs in Music Technology, Design and Animation, and Multi-media
Brooke College, Corby	TechBac[1]	BTEC/'A' level stem		Integrated BTEC, 'A' level and TechBac modules; Total Quality Management
Djanogly CTC, Nottingham	TechBac[1]; City and Guilds Diploma of Vocational Education	BTEC National in media systems; BTEC First and National completed in two years	GNVQ	Total Quality Management; Euroqualifications
Harris CTC, Croydon	TechBac[1]	BTEC First in Technology	NROVA; NVQ assessors planned	
Kingshurst CTC, Solihull				Kingshurst Diploma; International Baccalaureate
Leigh CTC, Dartford		BTEC/'A' level stem; BTEC First GNVQ; BTEC 14-16 in Technology and Business[2]	GNVQ; BTEC/'A' level core skills; NROVA; NVQ assessors	Euroqualifications; Total Quality Management
Thomas Telford School, Telford	City and Guilds Diploma of Vocational Education	BTEC/'A' level stem		

[1] Dixons Bradford CTC are also involved in the development of TechBac;

[2] Post-16 progression will be accelerated by easier access to courses.

career in business and industry and the study of vocational options is not a second-class route for the rejects of academia.

In turn, CTCs can enjoy the extensive involvement of local industry. This may take the form of secondments both to and from industry, work placements for students throughout their school careers, and joint projects where, in some cases, companies are located on-site in the colleges. Djanogly CTC have resident artists who run their businesses on the premises and assist with classes for half of the time. The students thus benefit from professional guidance and also learn about the realities of running a small business. The current artists in residence are a graphic designer and a ceramicist. These are to be followed by engineers in residence.

Dixons Bradford CTC are host to Bradford Technology, a company specializing in educational technology and a leading UK manufacturer of curricular CD-ROMs. As the new colleges become established within their local communities they are increasingly looking to market their modern facilities to business and industry and the local community on the model of further and higher education. Djanogly CTC offers MS-DOS-based training in CAD/CAM (computer-aided design/computer-aided manufacturing) and other information technology, conference interpretation facilities and language training; Dixons Bradford CTC and the BRIT School offer business conferencing; Leigh CTC offers information technology applications courses. Some CTCs also offer their services to the local community. Harris CTC has collaborated with local community education providers to offer evening classes to adults and public use of their sports facilities; Brooke College also has a community provision agreement with the local council, providing sports, theatrical and technological facilities and training in Danish.

To underline the importance of building productive relationships with business, Thomas Telford School, Brooke College, Djanogly CTC and Harris CTC have employed staff with industrial backgrounds as industrial liaison officers, which is unusual in a secondary school context although not in further or higher education. Thomas Telford School currently employs four part-time industrial liaison officers whose main function is to find work placements for the post-16 BTEC and 'A' level students and to be their industrial tutor throughout their period of work placement. They also act as ambassadors and marketeers for the college, looking for opportunities to build partnership initiatives and to offer business services. At Brooke College, two full-time industrial consultants were employed on a contract to develop general links with industry, seek work placements for the TechBac, and to work with industry to manage student progress. One of these served previously as the Chief Executive of the local Chamber

of Commerce and Industry. Djanogly CTC employed, for one year, a former business executive as the director of their centre for Industrial Studies. In addition to industrial training, the college also now hosts meetings for groups such as the Institute of Personnel Management and the Confederation of British Industry. Harris CTC appointed as industrial liaison officer a former careers advisor from the local FE college, who has been active in promoting the school with local industry and employers' organizations.

Quality systems

To endorse the integration of business culture, CTCs are also interested in Total Quality Management (TQM). Leigh CTC, Brooke College and Djanogly CTC have worked to provide training for their local Training and Enterprise Councils (TECs) where a quality endorsement such as BS5750 is frequently required. There has been much debate about the suitability of models and systems to assure quality in a school's context, and whether models developed for industrial use can be adapted successfully for schools. The BS5750 standard calls for an adherence to agreed standards, wherever these are set, whereas the concept behind the philosophy of TQM stresses a continual striving for excellence. These concepts need not be seen in opposition in practice and many institutions have found BS5750 a useful tool at operational level whilst espousing the philosophy of TQM to inform college ethos at top management level. Many FE colleges have found BS5750 to be a useful starting point from which to develop their own quality systems. For example, Sandwell College which was the first FE college to gain BS5750 for the whole institution, used it as a framework for development whilst adapting the system as far as possible to their own needs.

The CTC Trust and the Further Education Staff College (FESC) together with several CTCs and a number of grant-maintained schools are at present working on a project to devise TQM systems appropriate to schools and to test the feasibility of an award such as BS5750 in schools. It is intended that concurrent staff development may be accredited with the new Diploma in Educational Management that FESC is developing with South Bank University, at present under negotiation for accreditation at NVQ level 5.

Brooke College is working towards developing a TQM system and have sponsorship from a major company to support them. A former Chief Executive from the local Chamber of Commerce and Industry has acted as their industrial co-ordinator and advisor.

Business and the curriculum

As might be expected, there is a special curricular emphasis on the context of business and industry in CTCs. As in business, market research into the national and the local needs of students and employers forms the basis of a CTC's business plan. CTCs aim to offer their post-16 students a programme of study which is appropriate to the character of the institution, believing that the best course is to develop a smaller number of options to a high degree of excellence, thus fulfilling a niche in the overall picture of provision within the local area. Thomas Telford School are offering hotel and catering courses, since tourism is an important local industry; Djanogly CTC has written a BTEC National course in media systems and is currently in negotiation with the publishers of two local newspapers to develop another new BTEC National course, since there is a need for such skills in local industry. The aim is not to compete with local provision, thus causing wasteful duplication, but to complement it by offering high-level expertise in science and technology in a business context. There is a particular emphasis on the choice of vocationally-oriented awards such as those of the RSA Examinations Board, BTEC and City and Guilds; all CTCs with post-16 have chosen to offer BTEC courses, for instance. Since it is important that experience of business and industry is a central and coherent part of the school's programme, rather than an unrelated addition, then BTEC is useful as it offers unit accreditation for periods of work placement as integral elements of the course.

Working with industry is an important part of the curriculum with a special emphasis at post-16. It is characterized by:

1. A close relationship with the business and industrial sponsors;
2. The drive to make work experience an integral part of the curriculum;
3. A growing emphasis on internationalism.

At Thomas Telford School, for instance, some of the post-16 students find work experience in the administration at Tarmac, one of the college's major sponsors, as part of the business studies course. Students studying for the BTEC award in business and finance spend a month each year in the Chairman's own quarry products division and senior Tarmac executives spend time with student groups as part of course teaching.

An example of work experience providing actual curriculum material rather than being merely an adjunct to it is demonstrated at Brooke College where each post-16 student has a weekly half day work placement throughout their two year stay. This placement provides work assignments towards the TechBac. At Leigh CTC, all NVQ business studies students undertake a one-day-per-week placement where knowledge and skills learned in the simulated environment of the college office workshop are

further extended in a live situation. Work experience plays a similarly central role in post-16 provision at Djanogly CTC where students following the BTEC engineering courses which have a special element of working with electronic media systems are currently planning a period of several weeks with Central TV. Students have also worked at Bairdwear Garments where they designed fashion clothing; results of these design projects were used by the company when designing their clothes.

At the BRIT School students can experience a two-day-per-week work-based learning experience in the entertainment industry which furnishes assessment material for a range of academic and vocational awards. One option involves working in a 'special effects' firm. This provides assessment material for the BTEC National in performing arts, 'A' level art and design, City and Guilds level 2 in wigmaking and City and Guilds level 2 in television and video competencies.

Looking ahead to developments such as the advent of the Single Market and the disintegration of international barriers to world trade, CTCs are keen to emphasize to students the importance of an international outlook and are increasingly looking abroad for relevent work experience opportunities. Students at Thomas Telford School have arranged periods of work experience abroad for this year. They have arranged 30 placements in Italy and France. Students on the BTEC business and finance course will spend time working in French firms in Grenoble and a reciprocal project has been set up for 1993 between French, English and Italian firms and schools. The BRIT School has developed links for work experience with Radio RFM in Paris and Deutschlandfunk in Germany. Leigh CTC has also set up work placements in Holland and France; Macmillan College, who have a 'whole school' language policy have already made arrangements with the Spanish Ministry of Education for every post-16 student to visit Spain for cultural and work experience (Hagen, 1992).

Broadening the curriculum

If a larger percentage of students and therefore a wider range of ability than those who traditionally succeed at 'A' level are to be encouraged to prolong their education until 18, then a range of choices which extends beyond 'A' or 'AS' levels must be offered to them. If the point of extending education for young people is to equip them with a better grounding for the world of work than is presently the case, then recommendations for a common curriculum or for core skills by such bodies as the CBI make sense. CTCs have been quick to tackle both of these issues and to seek credible accreditation to underpin curriculum planning. In the future, it is intended that GNVQs will provide, at secondary level, a broad foundation for a number of curriculum areas; CTCs have been exploring these and other

avenues. Development work in broadening the curriculum has taken several directions:

1. Developing a broad range of vocationally-oriented options in addition to academic awards;
2. Seeking relevant and work-related accreditation at NVQ level 2;
3. Developing curriculum strategies that allow students a choice of accreditation;
4. Developing and accrediting a coherent common curriculum for all post-16 students.

Offering a wider choice of options for students has long been the practice in FE colleges which usually offer a range of 'A' levels in addition to BTEC awards and specific vocational training. Such a wide range of courses is unusual in schools. Although CTCs do not attempt to offer as wide a range of subjects as FE colleges, they do offer a variety of academic and vocational awards suited to their contexts.

As all BTEC awards are work-related, all CTCs offer BTEC awards at National level as an alternative and sometimes as an addition to 'A' and 'AS' level study; BTEC awards in science, technology and business predominate. Business and Finance is offered by Aske's College, Bacon's College, the BRIT School, Brooke College, Leigh CTC and Thomas Telford School. Engineering is offered at Djanogly CTC, and is planned for the new Landau-Forte College; science can be taken at Brooke College and Thomas Telford School. CTCs also offer particular awards where appropriate to the context. Thomas Telford School offers hotel and catering, and leisure as appropriate to the growing importance of tourism and leisure pursuits in the area. The BRIT School offers performing arts, media and the business of the performing arts.

Intermediate awards

There has also been a particular concern to offer relevant accreditation of sound currency at a level below 'A' level or NVQ level 3 for those students who wish to further their education but have not the time or capability to achieve level 3. Below 'A' level, many CTCs offer a range of vocationally oriented options such as the BTEC First Diploma, City and Guilds and RSA Examinations Board awards. The work-related AEB Certificate of Further Studies is also offered at a number of CTCs. Djanogly CTC and Leigh CTC have fully-equipped working offices where NVQs at levels 1 and 2 in business studies can be gained. Leigh CTC have trained four members of staff as NVQ assessors to work both with post-16 NVQ business students and with industry in the asssessment of staff in local organizations. Harris CTC are also now planning assessor training. Thomas Telford School's commitment to vocational education is

demonstrated by the fact that they have installed a fully-equipped training kitchen where they hope to offer NVQs from September 1992 in addition to BTEC First and National awards in Catering. The BRIT School runs a working box office where it is intended to offer NVQs in retail.

New strategies for broadening the curriculum

There is concern to offer programmes of study that open doors rather than close them and to offer students a choice of accreditation routes with the opportunity to transfer between academic and vocational options if desired. At the end of a year of study a student may choose to acquire either academic or vocational accreditation or both, according to their individual achievement or development.

Leigh CTC has developed a common foundation year for BTEC awards and University of Cambridge Local Examinations Syndicate (the Cambridge board) modular 'A' levels in business studies in conjunction with a group of other maintained schools. The idea of developing a common stem with branching routes in the second year of study, the 'Y' model, was first pioneered by Gloucester College of Art and Technology, using the Wessex modular 'A' level scheme and BTEC awards. The Wessex scheme, however, is still within its pilot phase.

At Leigh CTC, students follow a course of study, producing assignments that may be offered for dual accreditation, by prior arrangement with BTEC and the Cambridge board. Students may choose at the end of one year to follow a BTEC or an 'A' level route or in some cases to study for BTEC and one 'A' level. A mapping exercise is carried out in order that assignments may meet both Cambridge board and BTEC criteria, with core skills integrated across the programme. In the second year of the course it is possible to add further theoretical depth to mainline BTEC programmes by completing three further modules to gain the 'A' level qualification. Alternatively a student may choose to pursue an exclusively 'A' level route by adding further 'A' levels to be completed in one year, in which case they have the benefit of practical-vocational accreditation in their chosen sphere. Elements from 'A' level courses in accounts and business and finance are integrated into the foundation year, which facilitates the opportunity to continue 'A' level study in year two. A period of initial assessment and induction is carried out over a number of weeks in order that a student may consider fully which route will be most suitable. The schemes of work will shortly be published by BTEC and the Cambridge board and the common first year will soon be redesigned to fit the new GNVQ qualification at level 3.

Thomas Telford School, Bacon's College and Brooke College also offer joint programmes of 'A' level and BTEC study in science. Thomas Telford

School uses the Oxford and Cambridge 'A' level modular mathematics project, Maths into Education and Industry (MEI), in conjunction with BTEC science and engineering. At Bacon's College, a team of teachers and BTEC personnel have planned a two week introductory period of assignments and projects which not only assess students' abilities, but introduce them to new ways of working based on competence rather than traditional academic study. The BRIT School has a complex system of multiple accreditation programmes of study, together with a foundation entitlement for all students. A detailed description is given on page 41.

Core skills

CTCs have sought to offer students an integrated curriculum with a common entitlement curriculum for all post 6 (and increasingly for post-14) students. This is in line with the CBI and NCC call for a broad base of skills that will provide a sound foundation for future training and further study. CTCs, in the main, offer all students the opportunity to acquire the nationally agreed core skills through an integrated programme of study.

Where appropriate, these elements are taught through the curriculum and the student's whole achievement is monitored by the tutorial system, but extra support may be added if necessary. Where BTEC awards are chosen, these elements are accredited as an integral part of the curriculum, or in some cases, accredited across the curriculum by means of a curriculum 'package' such as the TechBac, or the City and Guilds Diploma of Vocational Education. Usually the CTC also adds other elements in keeping with its school ethos.

Foreign language teaching has posed particular problems for an integrated approach to acquiring core skills. This issue has been tackled successfully by the BRIT School, Leigh CTC and Djanogly CTC. At the BRIT School, foreign language teaching is achieved through a range of subject modules such as sound engineering in German and aspects of science in Danish. At Leigh CTC, elements of the business studies course are taught in European languages and at Djanogly CTC, foreign language study is part of the core requirement for their innovative BTEC engineering award. Leigh CTC are running a pilot project with NCVQ to accredit core skills across a joint programme of 'A' level and BTEC study; further details are included on page 39.

Accrediting the whole curriculum

Seeking accreditation for the whole curriculum and for all students pursuing academic qualifications, vocational awards or a combination of both has proved to be a challenge. It has often been true in the past that

schools and colleges seeking to broaden students' experience by offering extension or enrichment programmes have found it difficult to enthuse their clients because of lack of accreditation of these elements. CTCs, in common with other schools, have therefore sought methods of providing all-round accreditation for a student's whole curriculum. For example, Kingshurst CTC provides an integrated curriculum for its academic students by offering the International Baccalaureate instead of 'A' levels; this is a single curriculum package which allows some modular choice and flexibility. The City and Guilds Diploma of Vocational Education also seeks to provide allround accreditation from the age of 14, giving a broad grounding in the skills and business background necessary to prepare students for employment; this award is being prepared, in conjunction with the City and Guilds Development Unit, at Djanogly CTC, Landau-Forte College and Thomas Telford School.

CTCs have also devised their own schemes for accrediting the student's whole achievement. For example, the City and Guilds Technological Baccalaureate is designed as a whole curriculum package to provide allround accreditation for a student's experience within a technological framework; this is now being piloted by Brooke College and other schools and is described on page 34. The Kingshurst Diploma, devised by Kingshurst CTC, is another example of such a scheme (Bragg, 1992).

Developing new vocational routes

Parity of status between vocational and academic study is an issue which has been debated widely and identified as a matter of first priority. If vocational studies are to shed their unjustified second-class image, then new hard currency, in the form of respected awards must be developed. These must value academic and vocational study equally and be recognized as rigorous and relevant by both employers and higher education gatekeepers. By offering vocational awards alongside academic awards with equal status, CTCs have successfully persuaded their students and their parents of the worth of such awards, but the gatekeepers of higher education in particular must accord equal recognition if parity of status is to become a reality. CTCs have tackled this issue in two ways:

1. By building good relationships with a wide range of higher education institutions;
2. By working with major vocational awarding bodies to develop new study routes and awards.

The Smithers (1990) report found that in many higher education institutions, the criteria for admissions were often influenced by the personal preferences and the personal level of awareness of the individual admissions tutor. There are signs that in the present climate of debate higher

education institutions are making selection criteria more of a matter of policy, but it is still the case that one of the most effective ways of influencing higher education is to build relationships with individual institutions. Involving higher education in secondary school projects is one way that progress can be achieved. The following initiatives are taking place in CTCs:

- Students from the University of Sussex studying for an MA in Language and Arts Education are researching various aspects of the modular curriculum at the BRIT School, (described on page 41 onwards). In addition, two senior educational researchers are studying the modular curriculum with regard to action-planning guidelines and evaluation;
- A student from Nottingham University is currently undertaking research into the central information system at Djanogly CTC;
- Leigh CTC have formed a close working relationship with the Business School at Thames Polytechnic/University of Greenwich with a view to promoting the progression of BTEC students;
- Brunel University have invited CTCs to form similar arrangements;
- UMIST have participated as advisors in the TechBac initiative;
- Staff at Thomas Telford School have been working closely with Wolverhampton University (formerly Wolverhampton Polytechnic) to develop a Compact scheme.

Vocational study must open doors for the student to progress to the highest pinnacles of achievement in our educational system, as does academic study. Only then will it cease to be perceived as the second- option. Much work, for instance, has been carried out recently by the NCVQ and the awarding bodies to establish the parity of level 3 in the NVQ framework with the 'A' level gold standard. CTCs have therefore concentrated their efforts in this direction and have worked in conjunction with City and Guilds and BTEC on several exciting new developments. Chief of these has been City and Guilds' Technological Baccalaureate.

The Technological Baccalaureate (TechBac)

The TechBac was developed jointly by City and Guilds, the CTC Trust and four CTCs: Brooke College; Dixons Bradford CTC; Djanogly CTC; Harris CTC.

As the award is achievement-driven rather than course-driven, evidence from a wealth of different experiences can be used to satisfy its requirements. In this way, the TechBac framework draws upon existing and proposed national qualifications and provides an entry point into further education, higher education, training or employment.

It has a four-part curriculum specification, including a common core of technological and communication units. Certification is available at three levels:

1. TechBac (designed to be equivalent to GNVQ level 2);
2. TechBac with Credit (designed to be equivalent to GNVQ level 3, or 2 'A' levels plus skills from the common core);
3. TechBac with Distinction (designed to be equivalent to 3 'A' levels plus skills from the common core).

At the heart of the TechBac is a system of credit transfer. Credit can be transferred from training courses, work experience or awards of other bodies including GCE, RSA Examinations Board, City and Guilds and BTEC. Similarly, units of credit obtained via assessment for the TechBac can be transferred to any occupational or academic award to which they are relevant. To facilitate this credit transfer, each student has a separate Record of Achievements which documents all units of credit which have been completed successfully.

The TechBac framework recognizes that any subject may be approached from a number of perspectives: academic, technical, employment-related or artistic; students are allowed to choose whatever emphasis is appropriate to their talents and intended occupational areas. Learning is related to the technological design process and the individual's target level of qualification; the acquisition of knowledge is always related to learning 'how to'.

Traditionally, students have needed to specialize in one particular area and once the choice has been made, it cannot be altered without starting again. The TechBac, on the other hand, allows options to be kept open by providing a mechanism to bridge the academic/vocational divide and flexibility in which credits already achieved cannot be 'lost'. Further details of the TechBac are in *The C&G Technological Baccalaureate* (CTC Trust, 1991b).

Brooke College has been running the first Techbac pilot since September 1991 and most post-16 students at the college are working towards the award. Djanogly CTC will be offering the curriculum to 14 year olds from September 1992 as a framework for their 14-19 curriculum. There has also been a great deal of interest from other schools and colleges and the pilot will be extended from September 1992.

Djanogly CTC have been approached by DeMontfort University (formerly Leicester Polytechnic) and Nottingham Polytechnic who are interested in exploring the TechBac as an alternative route to their degree programmes.

Developments with BTEC

Principally the preserve of further and higher education, it has been possible for all post-16 secondary schools to offer a full range of BTEC programmes since September 1991. The espousal of BTEC by CTCs from the outset has contributed to this development. BTEC has proved useful for CTCs because it provides a broadly based education within a designated vocational area. 'Common skills' similar to the core skills advocated by CBI, NCC and NCVQ have always been a central consideration in BTEC awards. This distinguishes BTEC from the quite specific vocational training and upskilling courses found in FE. Indeed BTEC provides a good base for later specific training and adult upskilling as well as providing a good progression route to higher level study. CTCs have therefore found that working with BTEC to adapt awards to a schools' context offers good opportunities to broaden progression to higher education as the following examples show.

Djanogly CTC and the BRIT School have worked with BTEC to modify awards to meet particular needs. Djanogly CTC are piloting two special awards: a BTEC First in engineering and a BTEC National course in media systems. For these awards the usual three year timescale from BTEC First to BTEC National has been telescoped to allow students to complete both awards in only two years. The BTEC core at Djanogly CTC has now been revised to encompass foreign language provision. Other elements have also been customized to Djanogly's focus on engineering and 'hard' technology. Much of the work has been undertaken by the post-16 coordinator, who was originally seconded from the ORT organization and is now a permanent member of staff. Leigh and Djanogly CTCs have integrated modern languages into BTEC courses via the London Chamber of Commerce and Industry's Euroqualifications which they are currently piloting at pre- and post-16. These qualifications are now well established in France and Germany, but are new to the UK. The qualification involves aggregating the following into a group certificate:

- A business type language qualification;
- A series of computer application tests in a foreign language;
- Use of the telephone in a foreign language;
- Foreign language at work (FLAW) qualification.

A new BTEC title in the business of the performing arts will be developed and piloted at the BRIT School. Both the award and the results of the pilot work will then be available to the rest of the maintained sector. This award deals with the necessary business, marketing and technical skills specific to what is now seen as a burgeoning area of employment and export for this country. This award will be significant to the performing arts industry,

which has few formal qualifications to underpin its many vocational aspects. With a core based on the BTEC leisure option, the new award will offer expertise in sound business, marketing and financial skills together with a grounding in the history of the industry and with specific modules such as video retail and production, production management and electronic control systems.

Another interesting development nationally has been the proposals for a new BTEC First award in technology. This will provide a broad base with progression to five BTEC National awards: business and finance, engineering, leisure, science, and caring. As it is designed to complement rather than conflict with the syllabus for GCSE technology, it will provide a good intermediate option for post-16 students not ready to progress to NVQ level 3. Harris CTC and Bacon's College have recently been granted pilot projects for this award. They will be working in conjunction with ADT College who have a member of staff serving on the national steering committee.

At present much work is being carried out at national level by NCVQ and the major vocational awarding bodies to develop the criteria for GNVQs. Leigh CTC have been accepted to run GNVQ pilots at levels 2 and 3 with BTEC, and as previously mentioned, Kent Training and Enterprise Council is sponsoring the project to redevelop the BTEC/'A' level common core within the context of GNVQ. Leigh CTC will then lead the dissemination of this NCVQ pilot among Kent schools. Negotiations are currently underway for CTCs to pilot RSA Examinations Board GNVQs in languages and business.

Developments in curriculum methodology

The translation into a schools' context of the type of vocational award found previously in FE has had interesting consequences for teaching and learning methodology in schools, in much the same way as did the introduction of NVQs in some traditional areas of FE a few years previously. This has led to a confluence of two differing approaches and methodologies. Traditional school teaching towards academic awards focusses largely on what knowledge the student has acquired. For many subjects this can be more passively acquired, facilitating the treatment of the group as a class *en masse* rather than encouraging a consideration of the individual and their learning pace or needs. Academic awards focus on input and on covering a set syllabus. The learning process is therefore led and controlled by the teacher rather than being subject to the needs of the learner. Usually this means a set starting and finishing time to the course.

The competency-based philosophy of learning that characterizes all awards under the NCVQ umbrella, however, leads naturally to education as a process controlled by the individual learner. The emphasis is on measuring the student's acquisition of knowledge in terms of what they can do rather than what they can set forth on paper. Focussing on the learner rather than the process is one of the central tenets of NCVQ philosophy (Jessup, 1991) and the rationale behind APL. The student covers what he or she individually needs rather than submitting to a set syllabus at a set starting time. The teacher, instead of functioning as central controller finds a new role as mentor and personal tutor, enabling rather than dictating the learning process. In FE these principles have led to a widespread adoption of flexible learning methodology and a workshop rather than a set classroom format for learning. Students in many areas may therefore join courses all the year round, starting at a point suitable to their level of ability and prior knowledge. In many areas there has been a shift of emphasis to the workplace rather than simply the classroom, with the tutor providing assessment 'on the job' as well as at the college. This has already been very successful in breaking down the barriers that previously existed in FE between the college and the workplace.

These factors have also had a large impact on assessment and the recording of achievement. The emphasis on individual achievement favours continuous, criterion-referenced rather than norm-referenced assessment. Records of achievement enable credit towards an award to be registered over a period of time without being 'lost'.

The context in secondary schools is rather different. In FE a consideration towards the change in methodology was the considerable increase in the number of adult learners and the need to upskill the workforce who were already employed and therefore unable to attend full-time courses in the classroom. Adults respond readily to individual consideration and prefer the tutor in the role of mentor, often having unpleasant memories of teacher as dictator in the past.

However, in a secondary situation, at least from 14, the school is responsible for the welfare of the student and is accountable for their whereabouts and safety. At post-16, there is a need to accustom a student gradually to a different system where self-determination of learning replaces teacher control. In practice, this has meant a continuation of the greater consideration of individual achievement demanded by the National Curriculum pre-16. CTCs adopting vocational study routes alongside academic awards have therefore sought to adapt the very open systems of flexible methodology seen in FE to their own contexts. This has yielded a number of interesting initiatives.

Developing schemes for credit transfer

It is a short step from devising assignments eligible for multiple accreditation to a consideration of the concept of credit transfer. The issue of credit transfer is central to NCVQ philosophy. CTCs have been keen to explore this issue in two pilot projects.

In one project supported by NCVQ, Harris CTC uses the NROVA for all its students from the age of 11. The NROVA was originally chosen because of its vocational emphasis and facilities for formative action planning and credit transfer. Harris CTC have chosen to explore the concept of action planning and accreditation of children's work experience in all its aspects, including that gained from Saturday jobs and holiday employment. They have used criteria developed by NCVQ in the accreditation of unpaid work, whereby work is analysed in correspondence to the units and elements of competence needed to fulfill occupations already recorded in detail on the NCVQ database. Issues to be addressed are the 'shelf life' of evidence towards accreditation and the transferability of certain kinds of experience. It is hoped that work from this project may inform development of the new National Record of Achievement, now also under the aegis of the NCVQ.

Leigh CTC are working on another project concerned with credit transfer and supported by NCVQ. For some time, the NCVQ together with a national working party have been investigating the possibility of identifying a set of 'core skills', common to different areas and contexts and potentially transferable between a wide range of academic and vocational study. Using the NVQ assessment model, core skills can be assessed as units of competence, defined by performance criteria and range statements. A wide range of evidence from projects and assignments contributes towards assessment; credit is initially stored in the NROVA. Leigh CTC are working closely with the NCVQ consultant serving on the national working party to record core skills across the joint foundation stem programme of BTEC and 'A' level in business studies. Methods of recording competence against performance criteria have been developed and this project has now been joined by six other institutions from the maintained sector. The concept of accrediting core skills as units of competence, with credit transfer is germane to the new proposals for GNVQs and Leigh CTC will now be piloting these arrangements within GNVQs from September 1992. The project has received substantial sponsorship from the Kent Training and Enterprise Council.

The system of accrediting achievement according to a points system is also a feature of the FEU's discussion paper (FEU, 1992b) which suggests a national system for accreditation across a range of vocational and academic awards. The BRIT School is at present discussing collaborative work to explore these ideas with the FEU using the framework, already in place,

of their innovative modular curriculum; they will be exploring the idea of gaining credit from 14 to 19.

Developing flexible delivery systems

The BRIT School, Thomas Telford School, Djanogly CTC and Brooke College have adopted modular systems post-16 using flexible learning methodology as well as class-based teaching where appropriate to the task, underpinned by very supportive tutorial systems that enable staff to work closely with students and carefully monitor their individual progress.

Modular systems easily enable a learning programme to be tailored to individual requirements and quickly adjusted if need be. They also facilitate programmes that aim to offer a choice of study route and both practical and academic aspects of a subject.

Thomas Telford School offers a modular curriculum post-16, building on the experience of other CTCs to design a programme around a central core of BTEC awards with the opportunity to gain 'A' level accreditation in a number of areas. Each area of study is complemented by appropriate 'A', 'AS' and vocational awards together with the usual CTC entitlement of integrated core and themes, enrichment programme and work experience. This allows them to provide a broad foundation for Year 11, branching into courses tailored to their abilities and career choices in Year 12. All elements of the curriculum are accredited, now from the age of 14, using the new City and Guilds' Diploma of Vocational Education as a total curriculum package. There are plans to introduce the Technological Baccalaureate in 1993.

The tutorial system is also an important consideration at Thomas Telford School, and each student receives individual guidance to plan a personalized curriculum. Self-study and flexible methodology are employed at all levels of the curriculum, with a particular emphasis at post-16. As is the case with many CTCs, the college building was designed with a particular emphasis on flexible learning space which can easily be altered for particular learning modes. There is easy access to a range of electronic systems for self-study such as CD-ROM systems and networked learning material.

Brooke College has a similar commitment to flexible learning and has also broadened the curriculum at post-16 by mutual arrangement with other educational providers in the area on an open learning basis.

To give a better appreciation of a modular curriculum, the modular post-16 system in operation at the BRIT School is described below.

The BRIT School's modular curriculum

The BRIT Performing Arts and Technology School, which enrolled 180 sixteen and seventeen year olds in September 1991 operates a completely modular curriculum with a broad range of choice. Central to the school's philosophy is the concept of a Learners Charter which sets forth their conviction of student entitlement to a total academic experience of high quality, embracing both academic and vocational options. A foundation programme ensures a full and balanced curriculum aimed at the discovery and fulfilment of the potential of each individual. The system is learner centred and user-led, employing a wide range of delivery models and with an emphasis on guided student autonomy.

The three level structure

The curriculum is structured in three levels, corresponding to NVQ levels 1 to 3. It covers a number of subject areas and within these areas are offered a range of assignments leading to both academic and vocational accreditation. Even where the award is not intrinsically modular, as in certain 'A' level options, the work has been modularized to fit in with the rest of the programme. The programme is based on a range of BTEC and modular 'A' and 'AS' level awards, with a supporting group of appropriate vocational awards, such as City and Guilds television and video production, appropriate to the school's mission of servicing the performing arts.

Tutorial systems

The whole programme is structured in eight week blocks at the end of which each student's programme is reviewed and adjusted if necessary. The tutorial system is given great emphasis and each student reviews regularly with the tutor an individual programme hand-built according to career aspirations and a chosen route of progression. Action planning and APL are employed to ensure that each programme is appropriate to the student's needs and chosen destination. The staff member leading this element of the programme is a national NVQ moderator with much experience of YTS and TVEI development.

The foundation entitlement

There is a compulsory foundation entitlement for each student to underpin achievement in the school's areas of experience. These are:

- Performance: dance, drama, music;
- Production (technical and management aspects);
- Entertainment industry administration/business and finance;
- Information technology;
- Media;
- Mathematics/numeracy;

- Science;
- English/communications;
- Foreign languages.

Students must satisfy a defined level of achievement in all these areas and may do so either by accreditation of these elements integrated through the work programme or by following them as a separate subject or by both methods simultaneously. Thus a student may satisfy a requirement for English either by demonstrating achievement through an assignment for a BTEC award or by following a specific English course.

Integration of core skills
The foundation entitlement also overlaps with the BRIT School's requirement that the NCC recommended core skills be integrated throughout the student's entire programme. Course tutors must present module descriptors to a central coordinator showing clearly how assignments fulfill both core and foundation requirements. Post-16 teaching and tutorial staff work as a team to ensure that the student's programme is balanced.

The teaching of foreign languages, a core skills requirement, is also integrated where appropriate. In practice this means that a student may be studying sound engineering in German, or aspects of science in Danish. In this case work experience is also linked to the availability of specialist work placements in these countries.

Accreditation of prior learning
Students may gain exemption by prior experience, or by fulfilling the foundation requirement simultaneously through the range of their studies. APL allows the student also to gain accreditation through activities conducted outside school experience, such as Saturday jobs or vacation employment. In addition each modular assignment in the programme must demonstrate which core skill(s) can be integrated in the work.

Multiple accreditation
The BRIT School has worked closely with certain awarding bodies such as AEB Cambridge, City and Guilds, RSA Examinations Board and BTEC to ensure that any one piece of work is acceptable for a range of awards. A copyright law module, for example, may count towards

- An 'A' or 'AS' level in performing arts, business and finance or media;
- A BTEC First award in performing arts;
- BTEC National awards in performing arts, business studies or media studies.

The performing arts are used as a teaching medium for all subjects, where possible, giving a high degree of homogeneity to the curriculum and facilitating the use of integrated assignments for a variety of awards.

In effect, a student may study for a range of 'A' levels or a BTEC award or a BTEC award with one or two 'A' levels together with a number of specifically vocational awards appropriate to their chosen career. Such flexibility of progression opportunities makes a nonsense of academic and vocational divisions.

The BRIT School implements this curriculum through a range of teaching techniques from class-based options to flexible learning and self-study techniques. Located next to the Selhurst Centre of Croydon College the school can supplement its curriculum by an exchange of facilities and expertise with the FE college and can expand choice by adding study options on an open learning basis. This operates in a limited way at present, with both institutions looking for expansion as time passes.

V. The shape of things to come

Increasingly, in CTCs, as elsewhere in secondary education, the emphasis is shifting from the discrete post-16 curriculum to planning for 14-19 education and training. For the majority of young people this will mean a continuum rather than a cut-off point at 16, guided vocational choices beyond 14 leading to increased specialization towards 18 or 19, and a culture which takes for granted that education and training will continue throughout life.

The greater interest shown in recent years in learning from international education systems is clearly demonstrated in CTCs. For example, a choice of study routes, academic and vocational, full-time, employment related and of equal status, as in France and Germany; a choice of magnet style institutions aiming for excellence in science and technology, as in the USA; a longer school day and year as in Japan; an institutional culture which values and promotes skills as well as knowledge in science and technology, as in Israel; a modular system that allows for flexibility and credit transfer as in Scotland.

With the Single Market in Europe from 1993, and the free movement of labour, it is axiomatic that all young people will need an education system post-16 which has European 'currency' with mutual recognition of qualifications. This concept is built into the Technological Baccalaureate and in Euroqualifications each being piloted and developed in CTCs. There

are still issues to be resolved at a national level in providing broad vocational study routes from GNVQ level 2, and in ensuring parity of status for academic and vocational awards. These are areas in which CTCs hope to continue their contributions.

The CTC curriculum culture as it is being developed is vocational, scientific and technological with a business-oriented and international emphasis, and it is built on a foundation of sound, broad and balanced education. The imminent establishment of Technology Schools through the recent Technology Schools Initiative will enhance and further develop this to the benefit of the UK economy and to young people who will be spending the bulk of their lives in the 21st century. The 'fourth revolution' in English vocational education is now well underway with the promise of success.

Appendix A: International models of vocational secondary education

France

The French education system presents an orderly, varied and well-understood choice of routes that are accessible to everyone. There is opportunity to acquire vocational skills from 14 and an emphasis on science and technology which has led to particular success in high technology at university level. The *Grandes Ecoles* which produce top-flight technologists, engineers and administrators are the pinnacle of a system of technical higher education which has been expanded aggressively in post-war years; there have been many opportunities for older people to retrain or gain qualifications as well as a choice of progression routes for young people. In recent years the apprentice system has been reinstated and developed and it is through this route that many students gain their vocational and technological awards. Dr Ron Johnson in a recent study found that the qualifications obtained via this route now have parity with those gained by full-time study, although in the past they were considered inferior. This underlines a general French respect for learning.

Law defines the requirement for the titles of *artisan* or craftsman and a *maître artisan* or master craftsman. The entire French system of technical and vocational education and training is controlled and validated nationally under the general umbrella of the Ministry of Education.

At secondary level the desire for equality of opportunity has ensured that there has been no streaming in recent years in pre-16 secondary education, where a very broad core curriculum is offered. Post-16 divides into two broad routes, which are generally but not exclusively academic and vocational. In effect there is much flexibility of transfer between the two, and the academic route leads to a complex number of options which could be described as broadly vocational; these are documented comprehensively in *Certification Practices in the European Community* (Bill,1991).

The system can thus be summarized: the vocational route usually takes two years and leads to the CAP (*Certificat d'Aptitude Professionelle*) or the BEP (*Brevet d'Etudes Professionelles*). The CAP is vocation-specific with a broad base followed by specialization; the BEP offers broad work preparation. Both are recognized entry qualifications for industry and commerce and are taken at a vocational *lycée*, from the age of 14. It is possible to work for a CAP through taking up supervised part-time work with an employer and attending a pre-apprentice centre, prior to registering as a full-time apprentice.

Dundas Grant (1987) notes that, in a comparative study of French and English trade qualifications, the CAP is comparable with City and Guilds Advanced Craft level. It contains a surprisingly academic general

foundation which includes classical French literature and a high level of mathematics and it appears to be well recognized throughout France by both employers and students.

> a pop song heard on the radio a few years ago contained the line *j' ai mon CAP en délinquance* but it is doubtful whether a similar line in an English song 'I have my C & G Advanced Craft Certificate in Delinquency' would evoke the same response. (Dundas Grant, 1987, p. 54)

Although French students can follow a quite specifically vocational track from 14, it cannot be described as narrow.

The more academic route takes three years and leads to the Baccalaureate which is the recognized route to higher education and professional qualifications. The Baccalaureate can be taken in a variety of *lycées*, some of which are specifically dubbed *lycées d'enseignement technique* (technical lycees), where students receive a broad education and, in the case of technical *lycées*, a grounding for work. In the first year students study seven basic subjects across the humanities and sciences, including a foreign language and a specific technology. If they wish, in years two and three they can specialize towards a chosen baccalaureate. A choice of routes is available: 21 separate specializations in five general baccalaureates and three technical or vocational ones (Bill, 1991). Some university faculties demand particular specializations.

It is possible to transfer between the academic and vocational routes, particularly from the BEP to the Baccalaureate system. However, the number taking this option is not high because general education achievements have to be comparable between the two for transfer to occur. In some cases transfer is facilitated by the fact that all four levels of school (primary, college, *lycée d'enseignement professionel* and *lycée technique*) share the same campus.

A student's choice of route is decided by consultation between school, parents and the student. If parents disagree with the school's recommendation, the student must sit an external examination to join the academic route.

Dundas Grant (1987) notes:

> There is controversy both in England and France over the age at which narrower forms of vocational education should start. It has been traditional in Europe to give youngsters in their early teens the opportunity of attending technical/commercial schools. However, when the minimum school leaving age was raised to 16 in France and in England in the late 1960s/early 1970s it was thought that extended, non discriminatory general education would be of great benefit to the whole of the educational population. At an earlier stage than in England educationalists in France were made forcibly aware of the discontent felt

> by non-academic teenagers being put through the mill of general education studies which proved irksome for them and brought no tangible reward.

The French solution was to introduce full-time study from 14 for the CAP, however there is still a desire to align the vocational and academic routes more fully.

The Baccalaureate itself has been variously praised for its depth and its high standard. The traditional form, the *Baccalaureate d'enseignement générale* has given domains of study plus a broad core curriculum including the native language, one foreign language, human sciences, maths, and in the final year, philosophy.

An interesting new vocational development is the renamed *Baccalaureate Technologique*. Technical education is broadly understood by the French as meaning the learning of specific skills to carry out specialized work. These do not have to be manual, mechanical or scientific and courses in commerce, administration, medical care, agriculture, art and music can be included. It would probably be better understood in English as a Vocational Baccalaureate. It can be followed by a *Brevet de Technicien Supérieur* (BTS) particularly in a *lycée technique* and is highly valued by employers as a useful and practical qualification. This route can lead to entry in a university level technical institute.

The French favour a broad curriculum with a large element of general education at all levels, and particularly along vocational routes, which is typical of the general French respect for education and culture.

There is a high take up of university education, but a correspondingly high drop-out rate and France suffers from a shortage of higher level technicians in industry. It has also been obvious from unrest in French schools that the expansion in post-16 staying-on rates has resulted in gross overcrowding and inadequate facilities.

Germany

Of all models, the German seems to draw most admiration, although schools appear to be much less well-resourced in terms of new technology equipment than the English system. The Thames-Chiltern Chamber of Commerce & Industry (1990) praises the West German system as

> undoubtedly the most impressive organisation for training young people. It meticulously maintains the balance between continuing education and skills training that is responsible, in the end, for producing one of the most flexible and adaptable workforces in the world.

It is characterized by two telling factors: a high level of government intervention and regulation which coordinates education with economic

needs, and genuine parity of esteem for vocational education. M. Renz of the Berlin State Education Department comments:

> People in Germany do not think you have to go to elite schools to be a success. The failure or success of a child is determined by whether their transfer into the working world is successful or not.

A recent HMI report (1991a) provides up to date information. Although the system varies between the different *Lände* there are mainly three types of school in the secondary sector: the *Hauptschule*, the *Realschule* and the *Gymnasium*. The *Gymnasium* offers an academic education, leading to the *Abitur* examination and thence to university entrance. The *Hauptschule* offers a practical curriculum concentrating on vocational skills such as metalwork, technical drawing and typing. The *Realschule* offers a combination of both academic and vocational subjects and again the emphasis is on science and mathematics. Pupils may leave at 15 or 16.

All types of school offer 'work orientation' including work experience. All pupils receive core instruction in a number of practical and work-related subjects such as computing, a foreign language, draughtsmanship and communication skills.

One of the surprising things about the German secondary system is the readiness of parents, pupils and their teachers to consult about the choice of secondary institution. Few institutions operate an entrance test and therefore there is no implication of 'failure' if a student selects a practical vocational education; lack of competition in this case favours rational choice. If a parent wishes to send a child to the *Gymnasium* against advice they may do so, but the student must pass the end of year exams. Thus, the system appears flexible: pupils may transfer if they prove able.

At the end of formal schooling vocational training is available for all, particularly within the famous 'Dual System'. This facility is very popular – over 90% of students overall have received vocational education and training of some kind on leaving school and 70% of these go into the Dual System including 16.1% of all *Gymnasium* graduates. Training covers 378 classified occupations and involves practical work in a company combined with up to two days of theoretical instruction in a *Berufschule*. Students may alternatively spend a year in full-time vocational school (*Berufachscule*) doing basic training but this is less favoured by the government.

A broad general element to this training is favoured normally by both students and employers alike. It could certainly not be described as narrow skills-based training alone. The reluctance of English employers to allow trainees any broader instruction than is needed simply to get on with the job (well known by anyone who has worked in further education) is not shared by German employers.

As in the secondary sector all trainees undertake general education at the *Berufschule* for up to 40% of their course and study a broad range of applied skills and subjects. HMI (1991a) note that there is debate over whether general subjects should be taught separately or through the vocational curriculum, which is similar to the present UK debate on core skills.

It is worth noting that there is none of the confusion over vocational qualifications and their currency seen in this country. Local chambers of commerce and industry undertake the role of awarding bodies for vocational qualifications. The BIBB (Federal Institute for Vocational Training) together with KMK (the standing conference of ministers of education and cultural affairs of the *Länder*) undertake standards setting and training regulations. Vocational qualifications are respected and understood throughout society.

Some of the respect for vocationalism must be due to the celebrated *Meister* system, meaning literally a master craftsman or woman; the *Meister* system has survived fairly intact since the days of the medieval crafts and guilds. The system recognizes excellence in a profession; it does not rely solely on end-testing but can only be achieved by consistently producing superior work. Many students who progress to higher education gain respect for the *Meister* system as part of their dual system of training. Many of industry's future leaders progress through the *Meister* system and thereby gain both first-hand experience and a consequent respect for the title. It is also a necessary pre-requisite for setting up in business in certain professions.

Japan

The Japanese system of education and training is marked by several striking features. There is a universal reverence for all learning and the learning process is seen very much as continuing throughout a working career. The post-16 staying on rate is high and has been estimated at 94%. At secondary level students receive a very broad and thorough general education which may include vocational courses. Standards are high, and there is an emphasis on excellence in Maths, which provides a good foundation for later adult training in technology.

Japanese children spend more hours per day and more days per year in class than their English counterparts. Industrious Japanese pupils attend as many as 1,500 hours of lessons per year compared to 950 hours in England. The school day is, on average, two hours longer and the year is made up of 240 days against an English average of 190; Japanese children attend school on Saturday mornings.

In addition, because of the fiercely competitive examination system and the need to secure a place at 14 in a senior high school and later, in a university, Japanese children attend cramming schools in the evening.

At 18 those who do not progress to university or directly into employment may attend vocational schools which give a largely theoretical grounding upon which to base later practical vocational training.

The bulk of job related training takes place under the aegis of the company which frequently runs its own training institutions. As Japanese companies retain their employees for their working lives, it is worthwhile making a large investment in their training.

The Japanese system produces students with a thorough general educational grounding which provides a sound base for future training; the high attainment in mathematics is particularly significant. This general grounding, together with continuous updating, leads to a very flexible skilled and adaptable workforce.

This is more than helped by Japanese culture which stresses loyalty to the group at the cost of individual expression. Loyalty to the school and then the company, with a respect for one's elders and superiors leads to an attitude of willing perseverance and flexibility regarding working practice and working location which would be hard to match in other western cultures which stress the importance of the individual.

Pedagogic practice also seems old-fashioned to western eyes, with an emphasis on rote-learning and heavy reliance on official textbooks. Thomas Rohlen (1983) found that in practice the pre-prescribed curriculum often went over the heads of some students and the secret of success lay more in the students tractable attitude and perseverance than in the matter taught. However, in the face of stiff competition and fast-changing technology, Japan is investigating ways of updating the system to foster a more creative and autonomous approach in the future workforce.

It is also true that there is little contact with industry during school life compared with European counterparts. However, Rohlen (1983) notes that the curriculum fosters an unusually high level of economic and business understanding commensurate with the importance of trade to the Japanese economy.

Scotland

The Scottish system is successful in encouraging a larger and broader sample of the student population to progress to higher education (24% of those who qualify as opposed to around 15% in England). Vocational options such as medicine, engineering and law are popular. The Scottish BA is broader, takes four years and attracts greater numbers of students from working class and lower middle-class backgrounds.

An article in the *Times Educational Supplement* (March 15th, 1991) noted

education in isolation from the needs of the people, academia for its own sake, sits uneasily with the Presbyterian public service ethic that still underpins Scottish society.

The system differs from the English in several significant ways. A broad academic route post-15 (after the 'O' grade) leads to Scottish 'highers' at 17. Usually four or five highers are taken; these are usually midway in standard between GCSE and 'A' level. These are followed by 'SYS' certificates (sixth year studies) by those wishing to progress to an academic career.

A new and significant development has been the introduction of the modular system of national certificate by the Scottish Vocational Education Council (Scotvec), the Scottish counterpart of the English BTEC. Since the advent of Scotvec nearly all Scottish school children leave with a qualification and many are encouraged to progress to higher education after discovering interests and aptitudes during National Certificate courses.

The definition of 'vocational' is extremely broad – literally a study leading to employment. Because of this broad definition many students study a mixture of 'highers' and Scotvec modules. There exists a vast bank of possible approved modules. Modules are usually studied in groups of three and students are counselled to pursue sensible combinations leading to career opportunities. Scotvec modules progress to Scotvec Higher National Certificate, which may be used, like the BTEC National, as a progression route to higher education.

It is possible in Scottish schools to tailor-make a modular curriculum of both academic and vocational options to the individual student's needs and aptitudes. Scotvec is now bringing its programme in line with Scottish Vocational Qualification (SVQ) requirements as BTEC is doing in England with NVQs.

It is true that there has been some rationalization of the Scotvec modular bank and a move to package options in line with the way BTEC structures programmes in broad areas. This is in response to a valid criticism that a modular approach can lead to a shallower 'pick and mix' selection that does not encourage depth and progression in the subjects studied. The system is notable for its flexibility, refreshing lack of bureaucracy and popularity with students.

However, Scotland is now looking to broaden and restructure the curriculum further from 14 on the model of other European countries. Proposals are afoot for a three-year Scottish Baccalaureate (Scotbac) accompanied by a two-year Scottish certificate (Scotcert). Both qualifications would have a common core to allow students to transfer from one route to another. Core elements are likely to include mathematics, science and a foreign language. Scotbac students would choose between

either a science or arts oriented course, but would be able to add vocational modules such as technology or caring.

The Scotvec would cover 12 possible broad vocational fields. Non examinable elements such as physical education, personal/social development and religious education would be common to both. The report proposes that students could complete standard grade (GCSE equivalent) at 14 and thence progress to either a Scotbac or a Scotcert. Proposals have yet to be accepted by the Secretary of State for Scotland.

Spain

In some southern European countries, such as Spain, Portugal, Italy and Greece in recent years there has been a conscious effort to increase vocational training for industry and commerce, although all these countries have a tradition of arts and crafts, often aimed at the tourist industry.

Spain is an interesting example as recent reforms are typical of English and international moves to enhance and expand vocational education.

Previously, Spanish upper secondary education consisted of an academic stream and a vocational stream.

The academic stream led to a *Bachillerato* after three years which gave access to higher education. The vocational route, known as *Formacion Professionel* provided training at two levels leading to *Assierta Technician* (FPI) and Specialized Technician (FPII).

With the raising of the school leaving age to 16, there have been moves to restructure the system to maximize every child's potential and provide flexible progression routes. In the past the system was seen as too reliant on content rather than outcome, with high drop-out rates. The *Bachillerato* system is to be revised to provide an integrated foundation curriculum offering opportunities for academic and vocational study. Where a specific academic or vocational route is chosen there are to be opportunities for transfer at every stage of the process although vocational qualifications will not provide exemption from academic study.

There will be a common core of broad education for all students, with up to 30% of time for options. Compulsory options are a second foreign language and classical culture, basic principles of scientific method and the concept of teamwork across the curriculum. Other skills and concepts to be integrated are problem-solving and citizenship. These integrated core skills are comparable with those called for by the CBI in England.

The *Bachillerato* will lead from a common base into Upper Vocational Training, university preparation or preparation for employment. Assessment will be continuous and recorded in each student's log book. It will also be possible to join vocational training from age 16 and progress through three levels roughly corresponding to NCVQ levels 1 to 11D and

obtain a Technical Diploma. There are possibilities for transfer at each stage.

A Dual System on the German model has been organized for students in industry which will allow students to gain qualifications on a part-time basis.

A number of experimental projects are now in progress to trial aspects of the new curriculum. Among these are projects to trial modular vocational programmes and to integrate new technology into the curriculum.

Sweden

Sweden has an extremely high staying-on rate (96%). The Swedish concept of vocational is not at all narrowly skills-based. All vocational courses comprise a large element of general education.

Both academic and vocational courses are studied at upper secondary school with a choice of two, three and four-year courses. The vocational accreditation system is geared to delivery in upper secondary. To gain a qualification for work, the natural thing to do is to stay on at school in Sweden, although this has been aided by unemployment, particularly in the north of Sweden.

In 1984/85 vocational studies comprised about 76% of the curriculum and there has recently been a rationalization of courses into two broad routes: pre-university and vocational, both of which run three-year programmes.

Within the pre-university route, there are two 'lines' – arts, social sciences and economics, and science and technology studies. Each programme starts with a broad foundation year before specialization is gradually increased: some subjects such as computer science and a language are common to both.

The specializations are now rationalized to 18 options within several broad vocational areas. In line with worldwide reform, syllabuses are modular and based on competence, measuring outcomes. Objectives are stated clearly and goals are just short-term enough to sustain interest. Careers counselling and guidance are a very strong feature: the Swedish system has a follow-up system for every student up to age 18.

A strong partnership with industry is fostered with up to 60% of time in the final year spent in the workplace. It is intended that, as in Germany, much of the theoretical instruction will take place in school and its practical application will be seen in the workplace.

There are no exams in Sweden. Students on either route gain an upper secondary school leaving certificate and students on either route may progress to higher education.

Some company training is done in-house for young people, but is considered to lack breadth compared to vocational studies in upper secondary school and focussed too closely on immediate company needs. However, there is now a coherent modular system for all adult and school based vocational training.

The USA

The USA is notable for the freedom of a market situation in education and training. This has resulted in a wide and diverse provision of both private and publicly funded schools and colleges. Whatever the type of institution chosen, there is a universal respect in the USA for the business of earning a living and a college education is seen as a goal by all sectors of the population.

This respect for education, coupled with the American willingness to experiment and pioneer new routes has resulted in a number of interesting models.

At 17 most students have a choice of progression into community colleges, technical colleges, vocational schools, private sector specialist colleges, state universities or specific skill centres.

The community colleges have provided a model for similar institutions in the UK and offer a broad mix of academic and vocational courses. It is possible to study for a two year associate degree course at a community college and this may then be exempted towards a four year degree course at a higher education college. The associate degree is gained by accumulating a number of satisfactory credits. Many such courses include a common core of general subjects which may be exempted towards the higher qualification by an articulation agreement with the receiving college. The high participation rate (72.9%) may be influenced by the fact that, due to credit accumulation, time spent at college is not wasted even if personal circumstances mean that the student has to withdraw from the course.

Another particularly interesting feature of USA education is the creation of magnet schools. In line with the principle of a free market in education, the rationale behind the magnet school is that you can increase excellence by increasing choice. Magnets are state maintained schools with a particular theme. They offer a common core curriculum, usually mathematics, English, history, science and languages, with other courses particularly directed to a specialism.

Magnets have been created that specialize in science, mathematics, technology and computers, art, drama, dance and music, vocational and technical education and there are even military magnet schools.

Magnets recruit across catchment boundaries and have a high degree of control over their own affairs in order that they may be responsive to their

local contexts. They have been spectacularly successful in some areas such as New York and Kansas City where weak schools were closed and redesigned with new staff and a new specialist programme, on the same lines as a business turnaround. New York is America's largest education authority and has magnetized the entire local system, giving more schools a specialized programme.

In Kansas City the Public Schools Authority redesigned the entire school system as a network of magnets, each with its own theme and a range of pedagogical approaches. At secondary level these include engineering, technology, agri-business, international studies and health professions.

Before selecting these themes the authority carried out a market analysis, into the needs of local industry, children and parents and considered they were thus able to provide 'more distinctive' opportunities than traditional neighbourhood (comprehensive) schools.

Bruce Cooper (1987) notes that magnet schools raise certain questions central to the debate on improving educational standards today.

> Should education be standardized, centrally controlled and fairly heterogeneous, or should individual schools be managed semi-autonomously at the school so as to gain the advantage to compete..... should education stress equality or should it be concerned for choice and excellence?

Magnets are not without their critics in the USA, but the programme is growing yearly and has been seen as a useful aid to racial integration as recruitment cuts across ghetto boundaries. The need to recruit actively resulted in greater involvement with the local community and local business; a number of 'sink' schools have been metamorphosed into centres of special excellence, particularly in fields such as science and technology, to serve the country's future needs for a highly skilled workforce.

Magnets find favour with people to the left and the right in USA politics. Those on the left see disadvantaged children enjoying benefits, such as choice, mobility and excellence of specialist tuition whilst the right are pleased by the introduction of an 'education market'.

They have also influenced educational philosophy and practice in the UK; magnet schools provided models for the CTC movement, whilst Wandsworth's local education authority has taken the decision to 'magnetize' a number of its schools.

The World ORT Union

ORT was originally set up over 100 years ago in Russia to provide Jewish immigrants with vocational skills and language teaching in order to help them succeed as productive members of their adoptive countries. The

organization is now based jointly in London and Geneva, and its mission has broadened in line with modern society and its network now includes schools and colleges in 37 countries, with over 200,000 students worldwide. Its students are not exclusively Jewish and it is particularly active in the Western world. In 1989 an ORT International College, the Braude International Institute of Technology was opened.

The current President of The World ORT Union is Lord Young of Graffham who describes the ORT mission as providing

> a unique opportunity for the possession of a vocational or technological skill within the context of a broad, humanistic education as the basis of an independent livelihood and a fulfilling life ..... (ORT, 1991)

ORT are careful to match skills and technologies taught to the employment opportunities offered in each country, but the education offered is by no means merely skills-based. A culture of science and technology is fostered at all levels within all ORT colleges. For example, the Braude Institute specializes in high level electronic, automation and control engineering, industrial management and biotechnology.

ORT's emphasis on 'hard' technology in addition to expertise in 'soft' information technology and its world-wide brief have resulted in a number of innovative teaching aids that can be used on a distance-learning basis. Simulation environments can be set up to foster problem-solving, creative thinking and communication skills as well as technological expertise.

Currently ORT are active in setting up technological and education centres in Russia and Eastern Europe in partnership with those countries. They have also had influence in Britain. Lord Young notes (ORT, 1991, p.2)

> When I headed the British Government's main agency for manpower deployment, and later as Secretary of State for Employment and Trade and Industry, I was glad to bring with me the ready-made ORT ethos and methodology. The technical and vocational education initiative, the introduction of information technology centres, including the ORT ITeC in Manchester were in part inspired by ORT's example.

Lord Young also notes that Israel's technical high schools provided a source of inspiration for the CTC model following the former Prime Minister's visit to Israel in 1986.

Currently ORT provide CTCs with valuable curriculum advice and support and have provided a full-time teacher at the Djanogly CTC, who also co-ordinates the post-16 curriculum. Recently, a pilot training seminar on the utilization of hypermedia authoring languages and on applied maths for technical schools was run for senior teachers at Djanogly CTC. A teacher training package is being prepared for distribution in the ORT network. Full-time ORT teachers have also been seconded to Brooke College to teach electronics, and to Landau-Forte College.

Appendix B: A TechBac project from Brooke College

The TechBac is project-based and may be collaborative. Each student is asked to submit five projects, although this may vary if the student is taking a project-based 'A' level. Each project must address one or more of the 62 competences which must be covered in order to attain the TechBac; these are listed in the scheme pamphlet, available from City and Guilds (1991).

The individual projects will take into account one or more aspects of the following:

B1. An occupationally related problem solving project designed to achieve a specific outcome.

B2. In support of 1, how materials, equipment, tools and instruments, technical processes, technical and management systems, information technology and telematics influence the chosen occupational area.

B3. How science may impact the project or chosen area of work.

B4. How measurement and calculation may impact the project or chosen area of work.

B5. Understanding the work environment.

B6. Communication skills.

B7. Foreign language skills.

Additionally, students will need to show a record of achievement of other studies or activities, e.g. creative or performing arts, humanities or recreational activities.

For a student aiming for the TechBac with credit or distinction evidence of further skills or knowledge is required.

Since the TechBac works on a system or credit transfer, other qualifications and awards may be used to exempt students from the need to submit projects in some categories. The following exemptions apply:

- Any 'A', 'AS' level or BTEC exempt from B6;
- Any 'A' or 'AS' level in a foreign language, exempt from B7;
- Any 'A' or 'AS' level in any science, mathematics, geography, business studies, exempt from B4;
- Any 'A' or 'AS' level in any science, food technology or geography, exempt from section B3.

The first two projects at Brooke College are based on the students' work placements. The brief for the second project is given in the following pages.

Brooke City Technology College

Project 2 Work Experience – Investigation

The purpose of this project:

This project is designed to assist with understanding, in depth, the issues which confront business today. Such issues may include the development of new products; an improvement to a process; changes in working patterns; the introduction of or improvement to a scheme; the design and implementation of a new service.

Working on the project will involve you in both a live situation and the real process of project management which in some form or another is carried out in all work environments.

It will be up to you to work with your work placement supervisors and your 'A' level tutors to devise the most useful project. (Useful for your 'A' levels, TechBac topics covered and, most important, useful to your work placement.)

Within the project you may show evidence of measurement and calculation, use of foreign language and science to fulfil other areas of the TechBac or your 'A' levels. If this is likely to be the case you must talk with the head of the subject or your 'A' level teacher.

Each project will need to be approved by your employer and the TechBac staff before you begin. Before approval will be given you will need to have produced brief details of:

- The title
- Overall objectives
- Methodology
- Timetable

You may work collaboratively on this project – but you must show those sections that you are responsible for.

How will you benefit:

Because this will be live situation you will experience at first hand the challenges facing organizations. You will also be likely to learn about

- problem solving;
- costing;
- team work;
- analysis;
- timing;

- communication;
- objective setting;
- interpersonal skills;
- using initiative.

In the main report you will need to show the following:

The Title:

The title needs to convey exactly what you are going to investigate, for example:

- 'Flexible working patterns' does not convey nearly as much information as:
- 'An investigation to determine the effect of introducing flexible working patterns in the production department of.....'

If in doubt make the title longer to convey all the information.

The Objectives:

These are the statements against which your project will be judged. Each objective must be answered through the investigative work, for example:

- To investigate the range of alternative flexible working patterns available.
- To determine the most preferred flexible working arrangement.
- To investigate the operational and logistical issues associated with introducing the most preferred option.

Methodology:

This will include details of any scientific experiments; meetings with individuals; market research; design etc.

It is likely that these will be in distinct stages – one following another in a logical process.

It will be important to identify and describe materials, processes and practices involved as part of the methodology.

Conclusions and Recommendations:

This is the part of the report which summarizes the findings against the objectives. Each of the objectives must be answered.

Drawing on the findings you can then make sensible recommendations. All the recommendations must be supported by the evidence you have gathered and they must be able to be practically applied. It will also be essential to include estimations of cost if necessary.

The Main Findings:

This is the main body of the report where you can systematically show the results of your investigation.

Ideally this should be preceded by a contents page.

Appendices:

Here you should include additional material in support of your report which does not sit comfortably in the main text. For example company reports and literature.

The Report:

This will depend on the type of study you undertake. It is unlikely that you will take less than 2-3,000 words.

The report can be presented in a variety of styles including hand written, word processed, exhibition, audio, video etc.

The time taken to complete the report will vary according to the nature of the study. You will need to negotiate a finish date.

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